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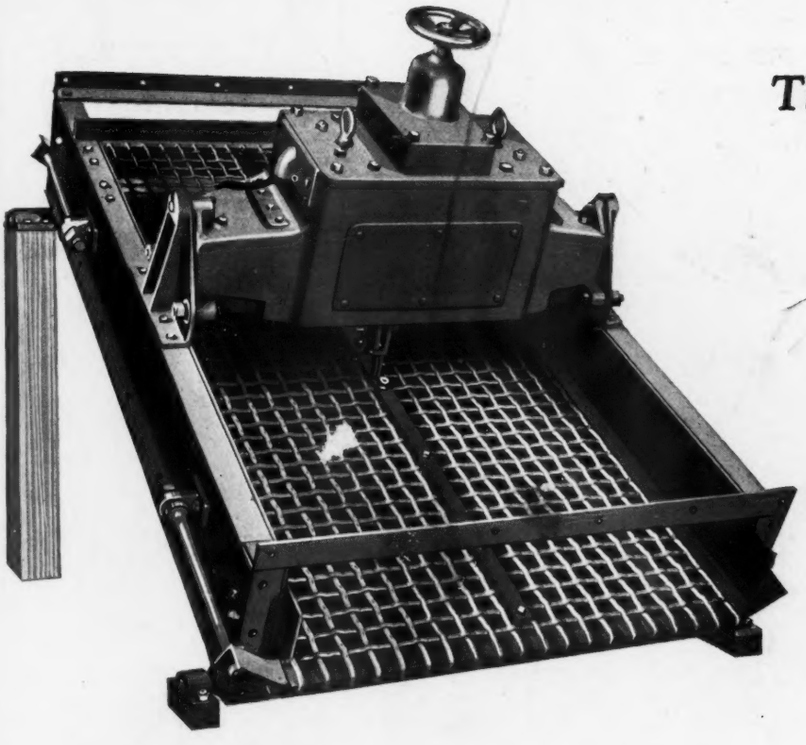

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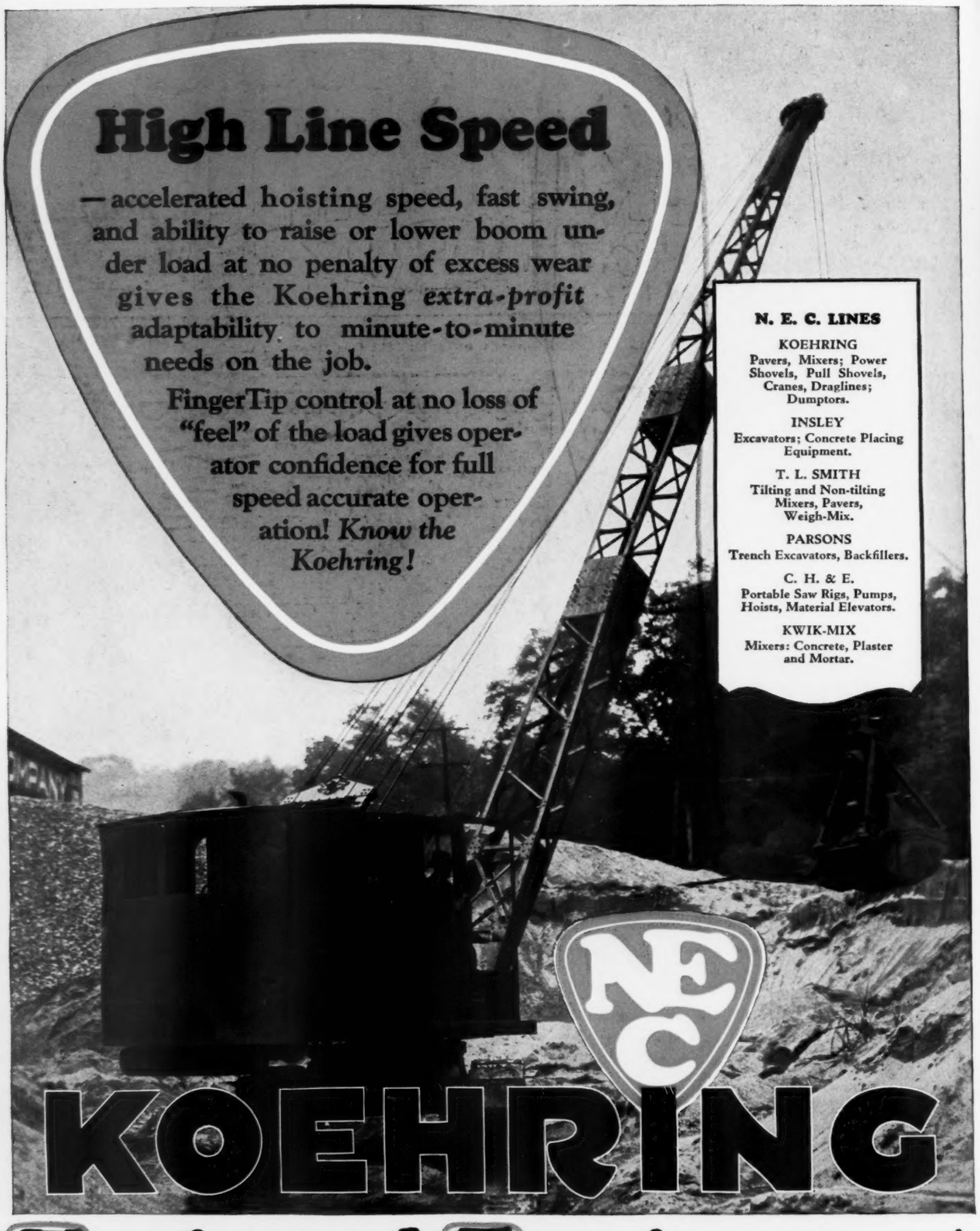
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Vol. XIX CHICAGO, FEBRUARY 26, 1930 No. 11

CONTENTS

New York Trap Rock Corporation Increases Capacity with New Plant at Clinton Point 21
Some Characteristics of the Ready-Mixed Concrete Business 31
Central Crushed Stone Company Operates New Crushed Stone and Concrete Products Plants at Lexington, Ky. 33
Road Building During the Next Decade Offers Unusual Possibilities 39
Economic Factor in the Development of Sand and Gravel Projects 45
Review of Injuries in Quarrying and Crushing Operations 43
Safety Through the Eyes 47
Review of Accident Prevention Work in Non-Metallic Mineral Industry for 1929 49
Cement Workers Discuss Accident Prevention Topics at Dallas, Tex., and Cincinnati, O. 53
Sand and Gravel Plant in Southwestern New York Obtains Gravel from Several Pits 57
Type of Car Bottom Is Major Factor in the Cost of Cleaning and Repairing 62
Committee Reports Unusual Procedures in Securing Adoption of Trade Practice Rules 64
Ready-Mixed Concrete Possibilities for Producers 67
Determination of True Price-Trend in Railroad Ballast 69
Use of Gravel for Low-Cost Road Construction 73
Men of the Industry 75

Personal Mention 82
Financial News Corporate and Business 84
Legal Information for Operators 86
Traffic News and Comment 87
Insurance Problems Discussed 88
Review of Foreign Practice 89
Latest News Flashes 90
New Machinery and Supplies 92

Next Issue March 12, 1930

Pit and Quarry
With which is consolidated
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Vol. XIX CHICAGO, FEBRUARY 26, 1930 No. 11

New York Trap Rock Corporation Increases Capacity With New Plant at Clinton Point

Large Structures on Site of Old Plant All of Which Is Being Dismantled

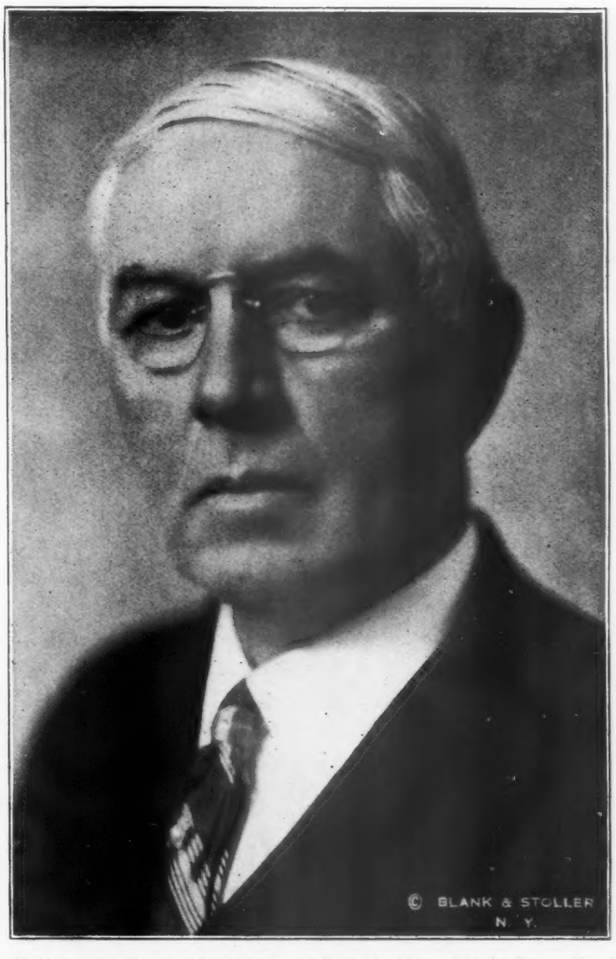
THE property upon which is being erected the new plant of the New York Trap Rock Corporation herein described is at Stoneco, N. Y., on the east bank of the Hudson River, about eight miles south of Poughkeepsie. The main tracks of the New York Central Railroad intersect the quarry, trains passing on an average of about one every seven minutes. At present there is one grade crossing at this plant and a watchman is on duty at all times but, with the completion of the new plant, this grade crossing will be abolished and a new overhead plate-girder highway bridge will be put into service. This bridge, at the south end of the plant, is completed except for its approaches.

History of Property

The tract of land in question was first made the basis of quarry operations in 1879 when it was acquired by the Barnegat Lime Company which produced lime on a small scale until the year 1887. The following year, this property was taken over by the New York Brokenstone Company which produced crushed rock, using two No. 6 and No. 8 crushers. In those times, quarry drilling was by hand, and horse carts conveyed the raw stone to the crushers. Similarly, materials for loading scows and sailing smacks were hauled in carts by horses which had been transferred from street-car service in New York City.

All shipments were by river, smacks having an average capacity of 90 tons, while scows held about 200 tons each. The plant's daily output was about 90 tons, so one day was required to prepare a smackload and about two and one-half days to load a scow. The principal shipping point was Tarrytown, but shipments went also to New York.

In 1890 the plant was purchased by the Clinton Point Stone Company and steam was introduced as the energy in rock drilling. Horses were replaced by a steam dinky which hauled loaded quarry cars to the crusher. For an unexplained reason, the cars and the dinky were of unlike track gauge, so that each track required four rails. Cars were spaced

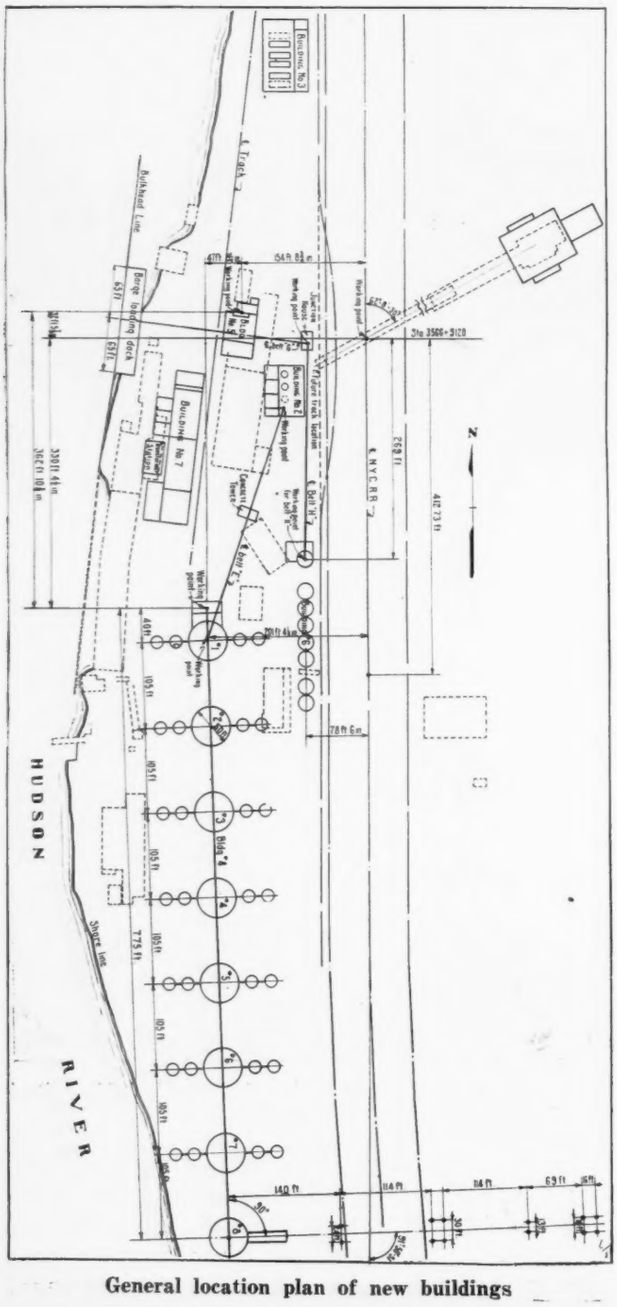


Wilson P. Foss, chairman of board, New York Trap Rock Company

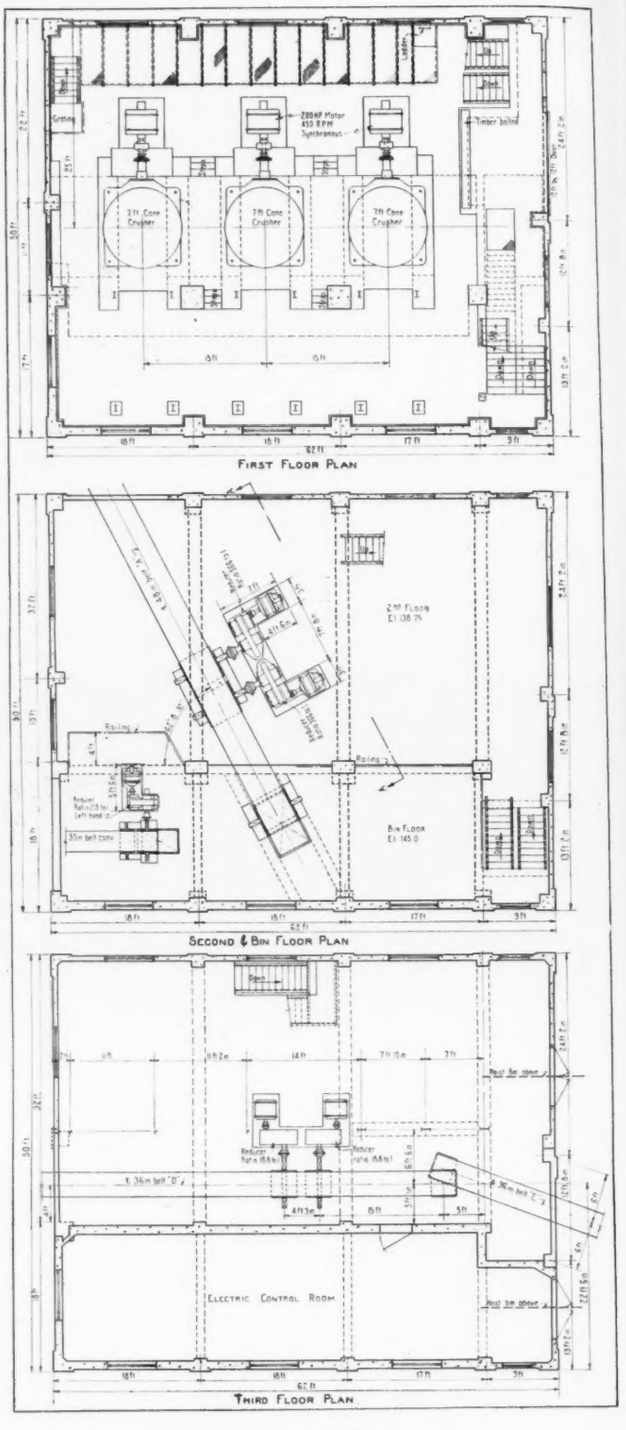
in a circle along the quarry face and were loaded manually. It is said that eighteen foremen were in charge of these laborers.

The plant was enlarged, in 1891, with second-hand equipment from the Storm King Stone Company which operated on Storm King Mountain. In 1893, $30,000 was expended on additional equipment including a set of rolls. About this time rock-loading was placed on a piecework basis, men being paid ten cents per ton. Also, mules again became the motive power for hauling stone to the crusher.

Operations continued thus until 1910 when the title was changed to Upper Hudson Stone Company. The plant was again enlarged and a competitor, the Cedar Cliff Stone Company, was purchased. In 1912 a No. 21 crusher was installed. Two years still later, the first steam shovel, a No. 91 Marion,



General location plan of new buildings



Floor plans, building No. 2

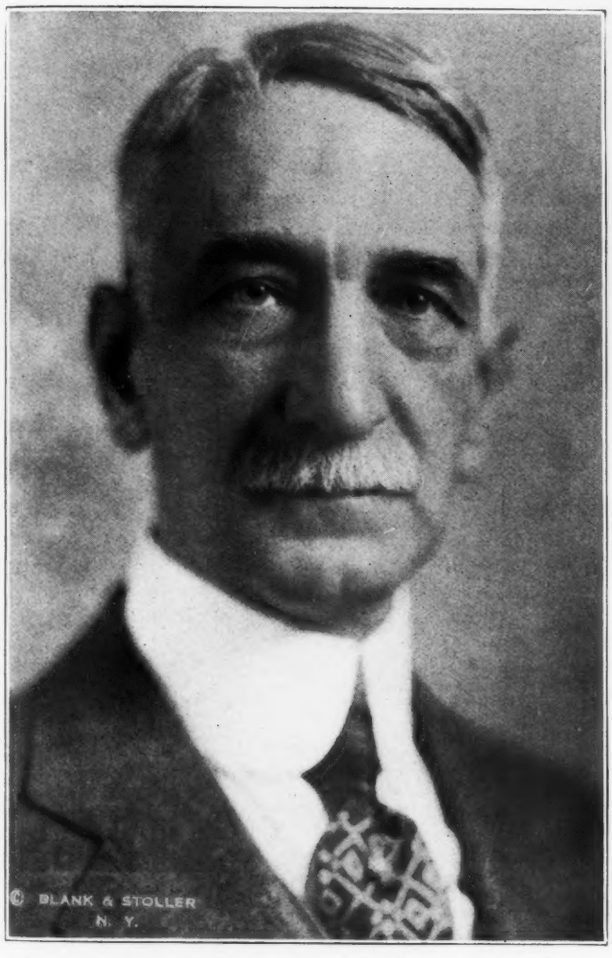
was purchased. At the same time two American steam locomotives were put into service. In 1915 a No. 110 Marion steam shovel and two more locomotives were added while, in 1916, an Atlantic steam shovel and another pair of locomotives were purchased. The company did all its primary drilling with well-type drills. The entire plant and property were acquired in 1919.

The Stone Deposit

The name of the company must not be taken as indicative of the kind of rock quarried here. In-

stead of the rock being of igneous origin and dark in color, it is a light-colored sedimentary-dolomite or magnesian limestone. Although the deposit has been operated for many years engineers estimate a reserve that will keep the new plant operating at capacity for forty years.

Primary quarry drilling is accomplished with nine Keystone well-type drills, each driven by a 15-hp. motor. The shovel equipment in the quarry comprises one No. 36 Marion, three No. 50B Bucyrus-Erie, and one 100B Bucyrus-Erie—all electrically operated. These shovels load the stone into twelve 7½-ton Mack trucks with side-dumping bodies built especially for this company by the Easton Car and Construction Company of Easton, Pa.



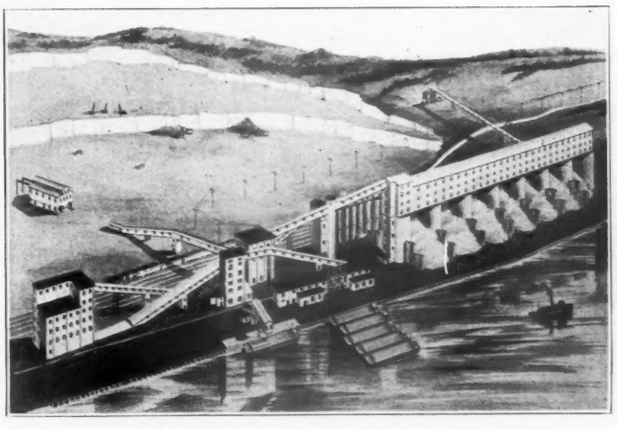
N. D. Lancaster, vice-president, New York Trap Rock Company

The new plant will occupy approximately the same site as the old plant, an aerial photograph of which is reproduced. Construction began about October 1, 1929, and the new plant is expected to be in operation April 1, 1930. With the exception of one conveyor which fits into the new plans, all of the old plant will be dismantled, this process having started December 1, 1929. Under normal climatic conditions the plant closes down when the river freezes, usually during the last two weeks in the

Mortimer D. Wandell, president, New York Trap Rock Company

year. Ordinarily, operations are resumed by the company about March 1. Plans were made whereby it was possible to continue productive operation smoothly during the months of October and November last, despite the large construction program which necessarily placed restrictions on space.

The new plant was designed under the direction of Sterling Tomkins, vice-president of the New York Trap Rock Corporation in charge of operations, with the assistance of E. Lee Heidenreich, Jr., chief engineer and general superintendent. The



Artist's conception of the completed plant

Left to right: Clabe Powers, asst. construction supt., Burrell company; E. Lee Heidenreich, Jr., chief engineer; J. Q. Taylor, construction supt., Burrell Eng. and Constr. Co.

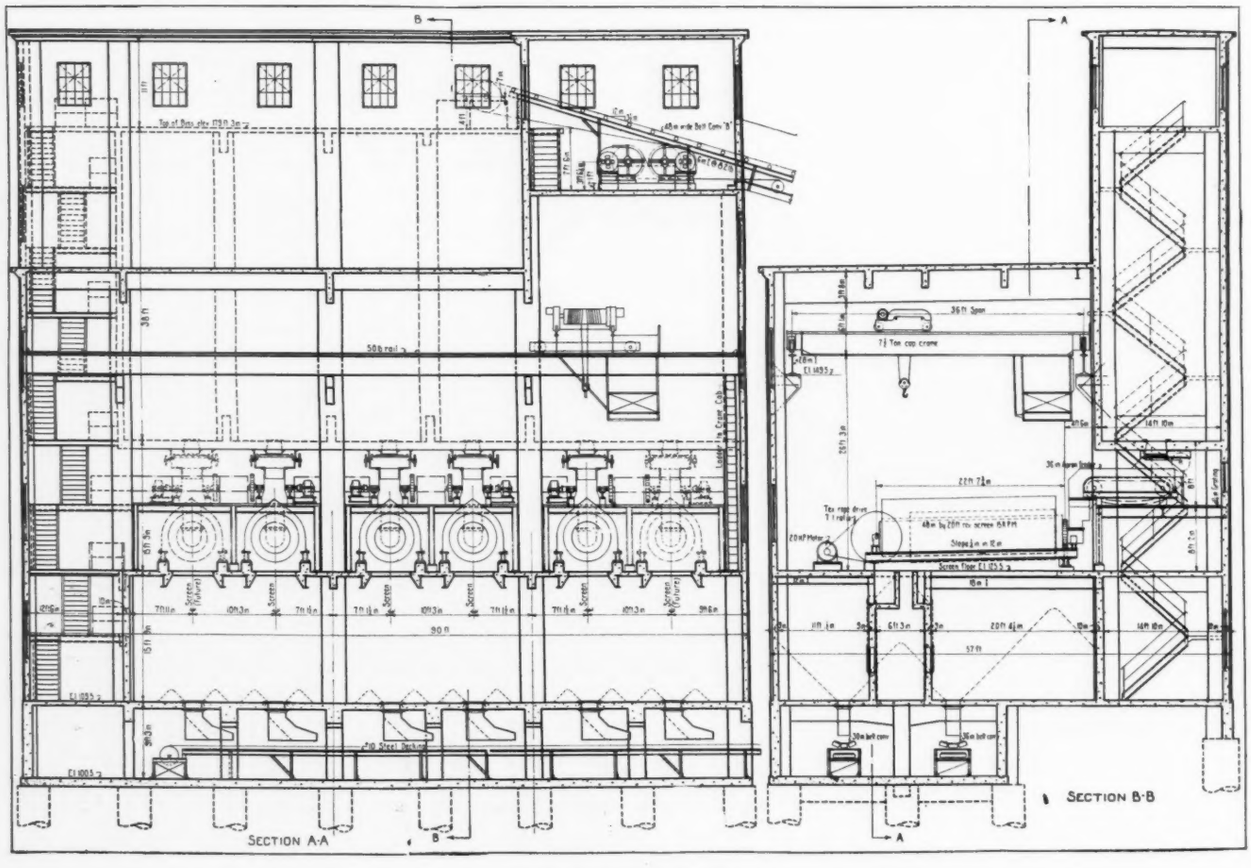
Burrell Engineering and Construction Company of Chicago, Ill., prepared the general plans into which the details were incorporated later. The Burrell company received the construction contract, including all buildings and conveyor bridges. Under a sub-contract, the Lackawana Steel Construction Corporation of Buffalo, N. Y., is fabricating and erecting all of the structural steel work. The owning company does the excavating for all structures and installs all of the machinery. The owner's electrical engineer, L. F. Miller, is in charge of all the electrical work. Piling for the dock and the bulkhead was placed by Foley Brothers, Inc., St. Paul, Minn.

The operating superintendent of this plant is Ray Coy. Construction is under the superintendence of W. S. McHenry for the New York Trap Rock Corporation and Joseph Q. Taylor, assisted by Clabe Powers, for the Burrell Engineering and Construction Company.

Flow-Sheet

Before considering the buildings and their equipment we may follow the travel of material from the quarry to its loading for shipment. The flow diagram herewith is schematic only and bears no resemblance to the actual ground plans of the new plant.

The raw stone from the quarry reaches the primary crusher, a No. 21 Allis-Chalmers gyratory, by trucks as explained. Thenceforth, through the plant, conveyors are designated in alphabetical sequence—as nearly as such a scheme is possible in the operations that are involved. Altogether there are 32 conveyors, but there are numerous pairs of conveyors that work in coordination and each such pair is assigned one literal designation. In this scheme conveyor A handles stone from the primary crusher while the last or X conveyor is to



Sections of building No. 3

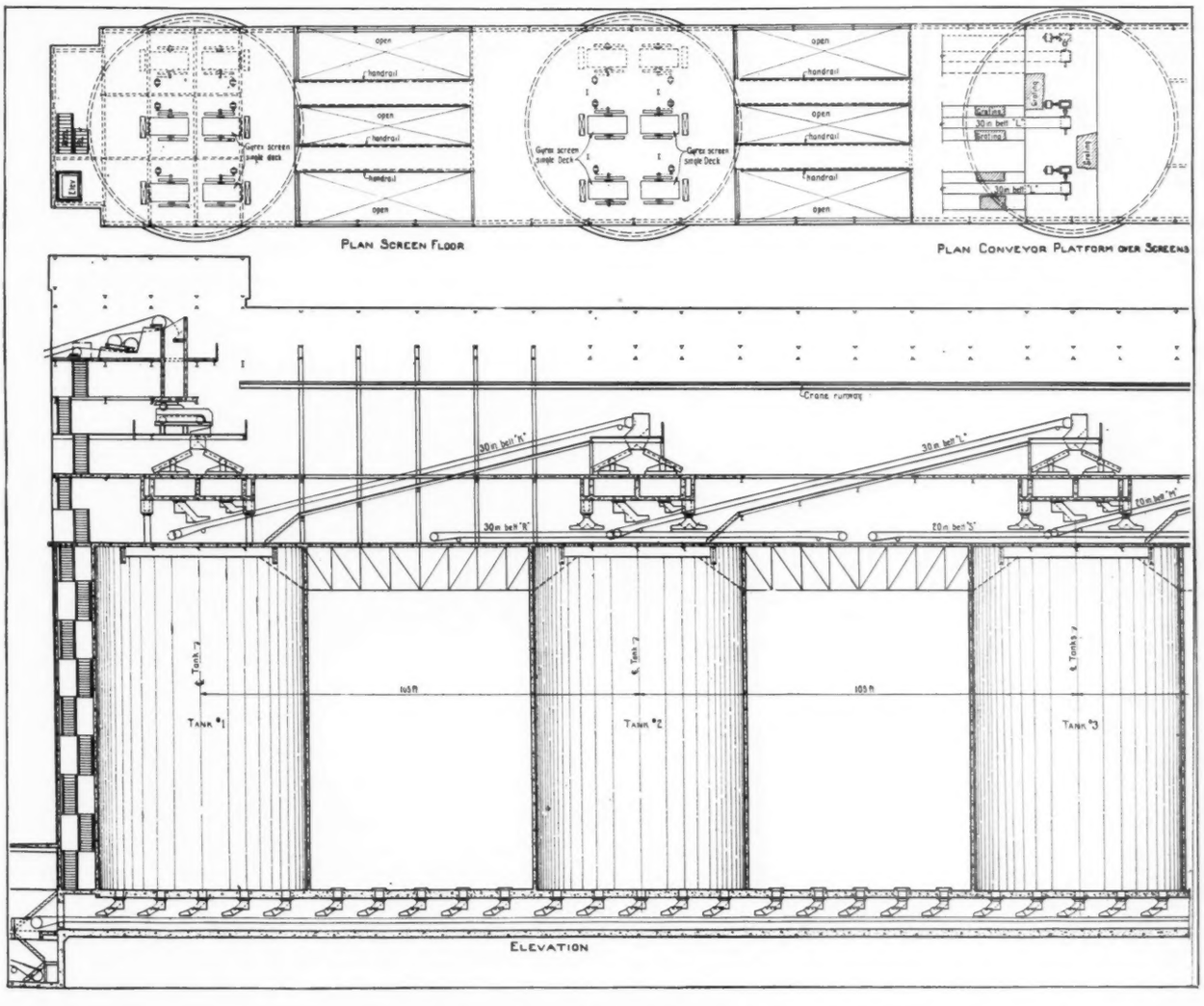
a "screenings disposal" dump, whence the screenings are to be handled to a storage pile by two Mack trucks.

Conveyor A discharges its load of coarse-crushed stone to a 7-ft. Symons cone crusher. After secondary crushing all of the stone is conveyed to the scalping-screen department which will have as initial equipment four 48-in. by 20-ft. Allis-Chalmers revolving screens. Provision is made for the later installation of two additional screens of identical make and size. The oversize or reject from these screens is taken to a second 7-ft. cone crusher for recrushing. Provision is made at this point for making a 2½-in. size or to return this size for recrushing. The recrushing stone then joins the product from the first cone crusher at the scalping screens. Space has been reserved for a subsequent installation of another Symons crusher of the same size.

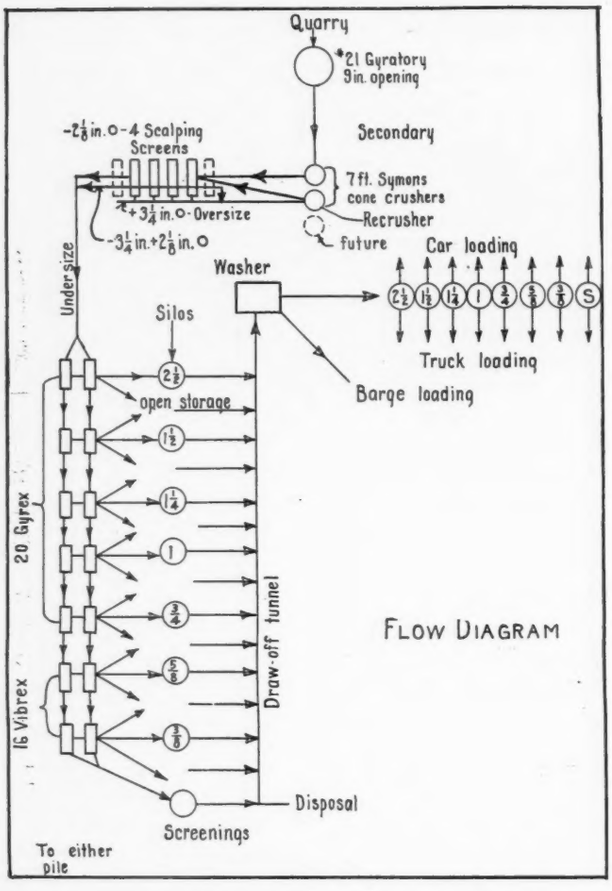
The final undersizes of the scalping screens next pass to the vibrating-screen and silo-storage department. There are eight silos, each 50 ft. in diam. by 80 ft. in height, placed on 105-ft. centers in a straight line. Each silo has its set of Robins vibrating screens. Silos 1 to 5, inclusive, each has 4 Gyrex screens, with provision for 2 additional units. Silos 6 and 7 each has 8 Vibrex screens, with provision for 4 additional screens each.

Aerial view of old Clinton Point plant

Each silo will store its respective grade of stone, starting with 2½-in. in silo 1, and ending with minus ⅜-in. or "screenings" in silo 8. The spaces between silos will be utilized for the open storage of sized stone. The total storage capacity of this



Plan and section, building No. 4



department is 142,000 tons, of which 100,000 tons are reclaimable by gravity.

Beneath the silos, in a tunnel, is conveyor F, upon which any desired grade of stone can be taken to the washer building. The washer equipment will be described later.

From the washery, the washed stone—either one size or any mixture desired being handled at a time—is taken by conveyors G and H to the battery of loading silos from which shipments are made by railroad and trucks.

Shipments by barge on the river will be loaded by conveyor J, which leads from the washery directly to the dock.

There will be seven buildings in this new plant. For convenience they are given numerical designations.

Building No. 1

Building No. 1 houses the large primary crusher. The pit for this crusher was built in January, 1928, in anticipation of the new plant, and has been part of the old plant for two seasons. The gallery for conveyor A was erected at the same time. The belt was originally 42 in. wide, but it is being replaced by one that is 48 in. wide. The old 42-in. belt will be used on Conveyor H.

The bottom of the crusher pit is about 40 ft. below the quarry floor. A distinctive feature of the new steel mill building will be the truck-dumping mechanisms which are of this company's design. There will be two of these mechanisms in duplicate. Each consists of a heavy steel framework and rails upon which runs a 4-wheeled "traveler." After a loaded truck is spotted for dumping, the traveler is pulled, by a 20-hp. Sheppard electric hoist, up a curved track. A hook suspended from the traveler engages in an eye on the side of the truck-body and lifts the side quickly but smoothly, thus permitting the rapid discharge of the load into the primary crusher pit. Past experience with one such mechanism has averaged about 90 truck dumps per hour, but it is believed that, when necessary, an average of 120 trucks per hour may be dumped with each of the new units. At this rate the plant will receive about 1,200 tons per hour.

Another interesting feature in building No. 1 is the large Allis-Chalmers crusher—previously mentioned—which is already nearly twenty years old but "still going strong" and in such excellent condition that its service is expected for many more years. The design of the crusher pit allows the easy removal of any crusher part. A spare mainshaft is mounted upon a small flat-car to be moved directly to place readily. A spare shell and spider are carried on hand. The over-all dimensions of this building are 66 ft. by 77 ft. by 46 ft. high.

A 40-ton P & H traveling crane with a 10-ton auxiliary hoist will extend from within this building to an outside yard where it can pick up parts from railroad cars on one of the sidings. Conveyor A from this building to the No. 2 building has 448-ft. centers and is driven by two 100-hp. motors.

Secondary Crushing

Building No. 2 is 50 ft. by 62 ft. in plan and houses the Symons units, which do both the secondary crushing and the recrushing. Each crusher is driven by a 200-hp. Allis-Chalmers synchronous motor, and has a 42-in. Traylor manganese-steel apron feeder. Each feeder can be pulled back away from its crusher upon rails. Above the feeders are Timken-equipped steel gates of Burrell design.

Among the equipment units in this building are the drives for conveyors A, C and D; electrical control equipment; individual power meters for the crushers; and meters showing the power consumption for each operation of crushing, scalping, sizing, washing, and loading. These meters render a visible account of what is going on, and is useful in the anticipation of power trouble or overloads.

Three conveyors traverse the distance between building No. 2 and building No. 3. Conveyor B, which carries the product from the first Symons cone crusher, is 430 ft. long, 38 in. wide, and is driven by two 100-hp. motors. Conveyor C returns the oversize from the scalping screens to the recrushing Symons unit. This conveyor is 30 in. wide and has 422-ft. centers. Conveyor D, which carries

the throughs from the scalping screen, is 36 in. wide, has 450-ft. centers, and discharges to conveyor E.

As will be seen in the general location plan of the entire plant, building No. 2 occupies an intermediate position between building No. 3 and building No. 4. Hence, when the crushed stone finally passes the scalping screen, it must travel through building No. 2 before it can be sized and stored in building No. 4. Such material is transferred, in the top of building No. 2, from conveyor D to conveyor E, which is 36 in. wide and has 301-ft. centers.

Primary Screening

Building No. 3 contains the Allis-Chalmers scalping screens. Each of the four units is driven by a 25-hp. Allis-Chalmers electric motor through a Texrope drive. These screens are wholly enclosed by dust-proof housings. Each has a Traylor manganese-steel apron feeder similar to those in building No. 2, except that they are only 36-in. size. The bin gates above these feeders are similar also to those in building No. 2.

The screens prepare three grade of stone—minus 2⅛-in.; 2⅛-in. to 3¼-in.; and plus 3¼-in. There are three bins beneath the screens. The 3¼-in. product is taken to the second Symons cone crusher, as previously explained. At option, the 2⅛-in. to 3¼-in. grade may be sent also for recrushing or directly to building No. 4, to which also is sent the minus 2⅛-in. grade on conveyor D.

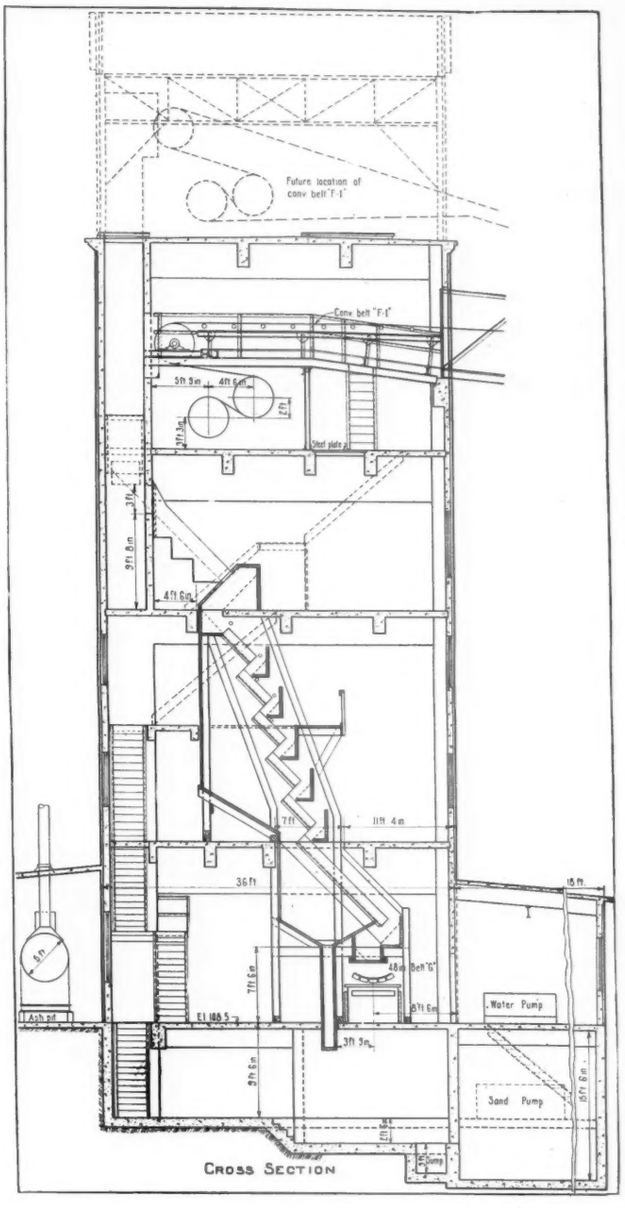
A 7½-ton P & H crane extends the length of this 57-ft. by 90-ft. building, which is the most northerly structure in the plant.

Sizing and Storage

Building No. 4 is the sizing-screen house erected upon the eight storage silos. This is a steel structure about 780 ft. long, 45 ft. wide and its eaves are about 140 ft. above ground level. In practice the silos are regarded as parts of this huge building. The silos are placed in a straight row. The level of the silo tops is known as the conveyor floor. At 16 ft. above this floor is the screen floor. The next floor, 18 ft. higher, is known as the bin floor; while the so-called head floor is still 9 ft. higher.

Conveyor E enters the north end of the building on the head floor and discharges its load into a concrete bin resting upon the bin floor directly above silo 1. A passenger elevator, built by the American Elevator and Machine Company, gives ready access to the several floors in this end of the building. A 3-ton P & H crane travels the length of this superstructure. The drive for conveyor E is in this building.

Each of the eight silos stores a separate grade of the crushed stone. From the head-bin material



Section of building No. 5

is fed by two Traylor manganese-steel feeders similar to those in No. 3 building, to the first battery of 4 Gyrex screens, the oversize from which—the 2½-in. product—goes directly to silo 1 unless diverted to open storage between silo 1 and silo 2. The troughs from this set of screens go by twin conveyors K, each on 112 ft. centers and 30 in. wide, to the next set of Gyrex screens above silo 2. After removing the 1½-in. oversize here, the remaining stone goes via twin conveyors L—duplicates of conveyors K—to silos 3 In like manner the undersizes progress from silo to silo, traveling on pairs of conveyors M, N, O, P, and Q. The last set of Gyrex screens is above silo 5. Above silos 6 and 7 are the batteries of Vibrex screens. The fines from the last set—the minus ⅜-in. grade of stone—continue by conveyor Q to silo 8.

The Gyrex screens are powered by 5-hp. motors

with Texrope drives. The Vibrex screens have 2-hp. motors and Texrope drives.

Extending in opposite directions from each of the main storage silos and at right angle to the center line of the building, walls have been constructed of concrete to retain a careful separation of the screened grades of stone that may be placed in open storage rather than in the silos themselves. For the sake of stability these walls consist really of outlying pairs of small silos with intervening webs or plain walls. The first outlying silo is 15 ft. in diam. by 35 ft. high. The outer silo is 15 ft. in diam. by 21 ft. high. These retaining walls will extend approximately 46 ft. both east and west beyond the outside of each respective storage silo. No crushed stone is intended to be deposited in these smaller silos.

Withdrawal from Storage

The tunnel that extends centrally and longitudinally of the storage silos is 12 ft. wide and 7 ft. high, inside measurements. Conveyor F traverses this tunnel. It is 48 in. wide and has 795-ft. centers. Five holes, 2 ft. square, and at 10-ft. centers, connect each silo, except silo 8, with the tunnel. Silo 8 is provided with 3 holes, each 2 ft. wide and 6 ft. long. Special spouts, provided by the company, permit the withdrawal of crushed stone from any desired silo. Similar gates are provided also for the open-storage spaces between the silos.

At the north end of building No. 4, conveyor F transfers its burden to conveyor F-1, which rises from a pit below the tunnel level to the top of building No. 5. This conveyor is 48 in. wide, has 370-ft. centers and is driven by two 100-hp. motors.

Washery

Building No. 5 contains the washing equipment, as all grades of stone are thoroughly washed before shipment. The incoming material is discharged from conveyor F-1 into a hopper bin on the third floor. Thence it passes by gravity to a four-compartment Berry washer on the second floor. This washer is similar to the machine in this company's plant at Tomkins Cove, N. Y., described on page 57, PIT AND QUARRY, January 1, 1930. It derives its name from the company's master mechanic, William Berry, of the Tomkins Cove plant. It is simply a series of stationary baffles over which the stone cascades under sprays of water which are furnished, at the rate of 3,000 gal. per min., by a Cameron centrifugal pump driven by a 200-hp. Allis-Chalmers motor.

The sand flows to a sump underneath the washer, whence it is handled by a Morris centrifugal pump, with a capacity of 2,800 gal. per min., driven by a 150-hp. Allis-Chalmers motor. Provision has been made for the subsequent addition of another Cameron fresh-water pump and another Morris sand pump—duplicates of those now being installed. The sand sludge is pumped to a large settling basin 2,500 ft. south of the plant.

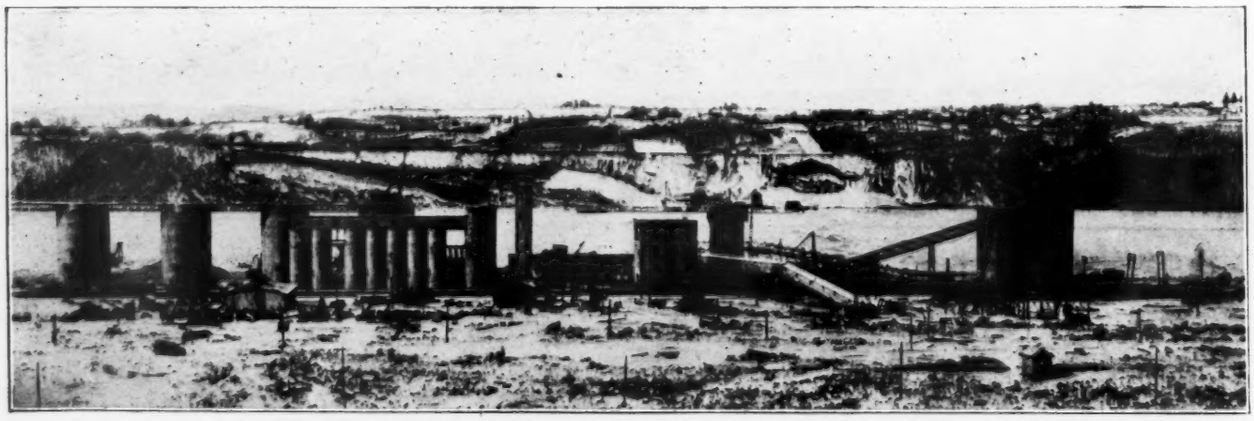
A small second-hand boiler supplies steam for heating both this building and building No. 7 in cold weather.

All material that is to be shipped by rail or trucks leaves the building by conveyor G, which is 48 in. wide, on 104-ft. centers, and driven by a 20-hp. motor. This conveyor runs easterly to a small building known as the Junction House, where the washed stone is transferred to conveyor H, which is 42 in. wide and extends south on 316-ft. centers to the north end of building No. 6. This conveyor is driven by two 75-hp. motors, in building No. 6.

Building No. 6

This is the structure erected upon the eight silos from which shipments are loaded into freight-cars and trucks. This building is 15 ft. wide and about 120 ft. in length, north-south, parallel to and immediately west of the right-of-way of the New York Central Railroad tracks.

Conveyor I, 36 in. wide, on 176-ft. centers, and driven by a 30-hp. motor, receives material from conveyor H and, by means of a Robins traveling tripper, deposits it in any desired silo. Each silo is 20 ft. in diam. and 60 ft. high. Although they



General view on February 5, 1930, looking west from quarry

are not in complete contiguity, these silos are in a straight row. They receive grades of stone corresponding with those in the large storage silos in building No. 4. Thus 2½-in. washed stone is deposited in silo 1, 1½-in. stone in silo 2, 1¼-in. in silo 3, 1-in. in silo 4, ¾-in. in silo 5, ⅝-in. in silo 6, ⅜-in. in silo 7, and the washed screenings (minus ⅜-in.) in silo 8. These silos have a storage capacity of 3,500 cu. yd.

Stone is loaded out to cars on the east side of the silos, or to motor trucks on the west side. At one end of this building on the west will be a 20-ton truck scale. On the railroad side a 100-ton track scale has been provided for. The scale-beams of both scales will be in the shipping office in this building, and operated by one man.

In anticipation of the possible future desirability of preparing mixed grades of stone, a tunnel extends beneath this building, but no handling equipment is being installed therein at this time.

Barge Shipments

Shipments for water transport are not conveyed to building No. 6, but go directly from the washery building—No. 5—by conveyor J to the barge dock. This conveyor is 48 in. wide and 108-ft. centers. It is driven by a 100-hp. motor.

A Robins tripper for automatically trimming the barge-loads is located at the discharge end of the conveyor, and is operated by the same man who controls the Lambert pulling hoist for spotting the barges. Both of these devices are electrically operated.

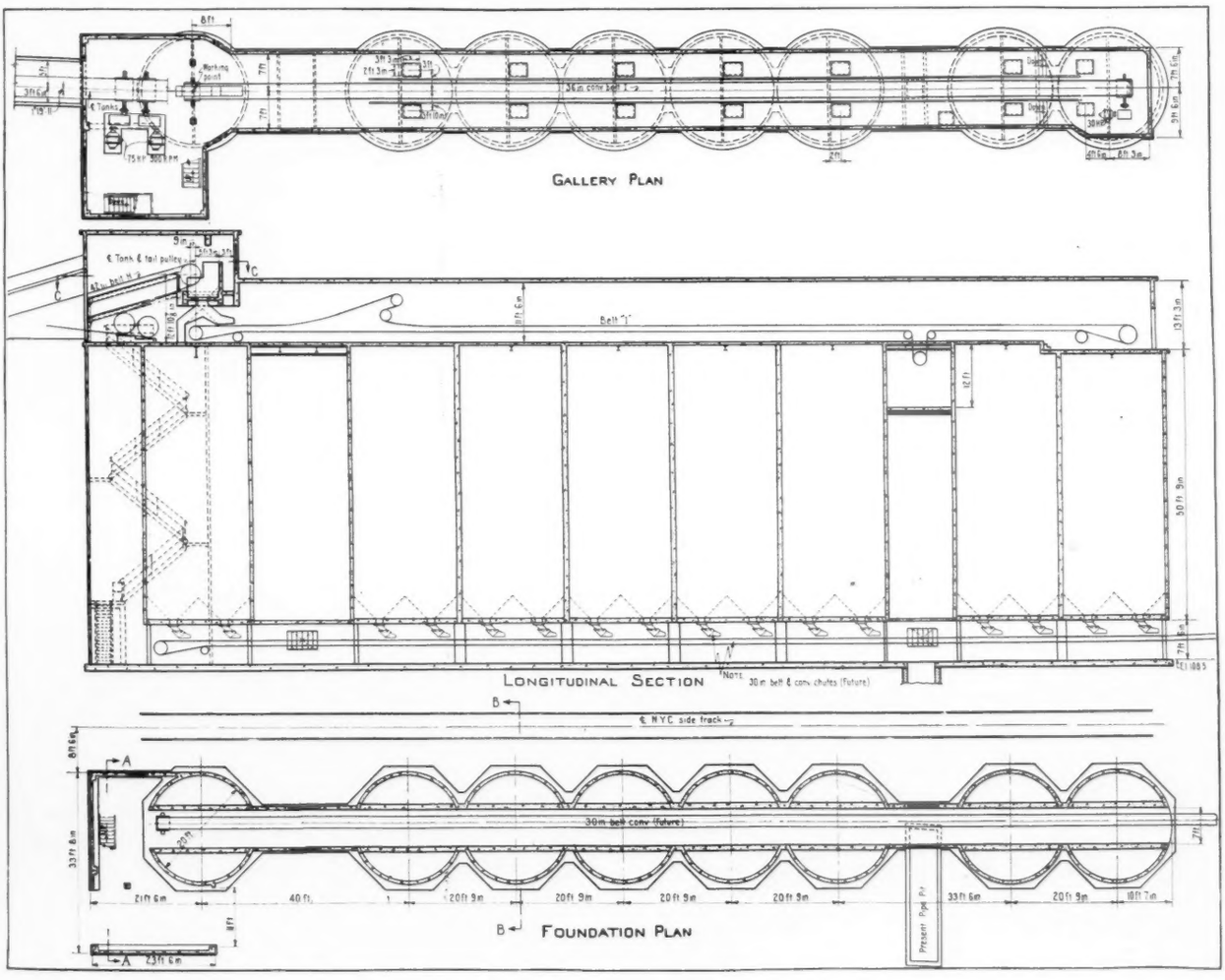
Provision has been made for loading sea-going vessels outside of the main barge-loading station.

Building No. 7

Building No. 7 contains the plant office, wash-room, store-rooms, machine shop, blacksmith shop, compressor room, and electrical shop. It is concrete, of slip-form construction, and 187 ft. long.

A 10-ton P & H crane travels the length of the store-room, which is 60 ft. long and 36 ft. wide, and over the machine and blacksmith shops.

The office is on the second floor at the north end, above the wash-room. The machine shop is 65 ft. long and 36 ft. wide and will be equipped with lathes, planers and other shop tools. The blacksmith shop occupies the south end of the main portion of the building and is 40 ft. by 36 ft. A



Plans and sections, building No. 6

railroad siding runs into this shop from the south. The shop contains a forge in each corner, a well-drill sharpener, a jackhammer drill sharpener, and mechanical hammers.

The compressor room adjoins the blacksmith shop on the west. It contains an Ingersoll-Rand compressor driven by a 300-hp. General Electric motor. Adjacent to the main store are three smaller rooms, which serve as the electric shop, the electric store-room, and the switch-room, which comprises General Electric equipment.

Outside of this building is the electrical substation furnished by the Westinghouse Electric and Manufacturing Company. Power is received at 66,000 volts. For all motors over 25-hp. capacity each, the voltage is stepped down to 2,300 volts. All other motors take 440 volts. Allis-Chalmers transformers are used.

General Information

All of the conveyor idlers and pulleys in this plant were manufactured by the Robins Conveying Belt Company. The 48-in. conveyors ride on 5-pulley troughing idlers, while all others have 3-pulley troughing idlers—all equipped with Timken bearings. Rubber covers are placed on all idlers that are located under loading points. In most cases, the conveyor take-ups are of the vertical-roller gravity type.

All conveyor drives consist of Falk Corporation herringbone reducers directly connected by Falk flexible couplings to both the motors and the drive pulleys. Conveyors A, B, D, E, F, and F-1 have tandem drives.

All conveyor belting is supplied by the Robins Conveying Belt Company.

All of the conveyor motors were made by the Allis-Chalmers Manufacturing Company. There are 32 such motors of a total capacity of 1,595 hp.

The gross weight of structural steel required for this job under contract to the Lackawanna Steel Construction Company is approximately 2,200 tons.

Officers of the New York Trap Rock Company are: Mortimer D. Wandell, president; Sterling Tomkins, vice-president; N. D. Lancaster, vice-president; Walter Jones, Jr., secretary-treasurer; Wilson P. Foss, chairman of the board; Charles T. Tisdale, purchasing agent; E. Lee Heidenreich, Jr., general superintendent and chief engineer.

This company operates plants also at Cedar Cliff, Haverstraw, Tomkins Cove, and Verplancks, all in New York.

United States Most Important Factor in Sulphur Production

The recent history of sulphur chronicles the rise of the United States from a position of dependence upon foreign deposits to a place of dominance in world production, so that this country not only supplies its domestic market but furnishes the outside world with exports approximating 700,000 long tons annually, says Robert H. Ridgway in a report recently issued by the United States Bureau of Mines, Department of Commerce. This rise was made possible by the invention of a new and ingenious method of mining, the Frasch hot-water well process, and by the discovery of extensive deposits strategically located near the coast of Louisiana and Texas and near the sources of cheap fuel supply necessary to the unique mining method employed.

The thirteen-year period, 1904 to 1916, was characterized by a steady increase in the domestic production of pyrites, by an increase in the imports of pyrites, and by a sudden increase in the production of domestic brimstone. This increase in domestic production of sulphur was accompanied by decreased imports and increased exports of sulphur resulting in a net annual outflow of 6,000 long tons. If this net annual outflow is deducted and proper allowance is made for a total of more than a million tons of brimstone accumulated in stocks during the period, the total sulphur made available in brimstone and pyrites indicates an average annual consumption of about 794,000 long tons of sulphur, exclusive of any utilization of by-product smelter fumes.

The entry of the United States into the World War marks an important milestone in the expansion of the American sulphur industry. The need for transportation facilites for essential traffic between the United States and Europe resulted in drastic curtailment of bottoms engaged in other traffic. Imports of pyrites from Spain and Portugal at first could not be increased to meet the growing demand. Later, in 1918, imports of pyrites fell off in amount. Therefore manufacturers turned more and more to domestic brimstone. At the close of the war many of the industries continued to use sulphur rather than change their plants back to handle pyrites. During the period 1917 to 1928, inclusive, the average annual production of brimstone in the United States amounted to 1,608,000 long tons, compared with an annual average of 365,000 tons for the period 1904 to 1916, inclusive. Imports of foreign sulphur during the period were negligible. Exports during the period averaged annually about 449,000 long tons, increasing from 152,736 tons in 1917 to 789,274 tons in 1927, but decreasing 13 per cent in 1928 to 685,051 tons. Domestic pyrites production decreased from an average annual of 296,000 long tons (1904-1916) to an average annual of 257,000 tons (1917-1928), whereas pyrites imports dropped from an average annual of nearly 800,000 long tons for the earlier period to an average of 379,000 tons for the later.

Some Characteristics of the Ready-Mixed Concrete Business*

By H. F. THOMSON,
Vice-President, General Material Co., St. Louis

THE commercial operation in ready-mixed concrete as now established in a large number of communities is not the simple, somewhat haphazard throwing-together of cement, aggregates and water as implied by the old expression "concrete mixing," but is a complex activity involving the characteristics of several standard types of industrial effort. The following remarks discuss some of the features contributing to this complexity. Analysis of these features may be informative alike to those now in the business and to those who may be merely watching this new development in the construction field.

For the sake of clearness, we may define "ready-mixed concrete" as concrete delivered to the contractor at the site of the work, ready to place; it might better be termed "pre-mixed concrete," regardless of whether central-mixed or truck-mixed, or delivered by rear-dump or agitator trucks. It goes without saying that the concrete as delivered must be suited to the character of work. Such an activity belongs to the modern business world, and was impossible a generation ago because, aside from the improved technique of concreting itself, the agencies necessary for the business such as the telephone and motor trucks were not as readily available as now.

Romance of the Business

Some idea of the unique character of this new business may be gained by pausing to consider what it attempts to do; namely, the production at a moment's notice of a perishable product, each batch being made-to-order under rigid mechanical control, which product is delivered immediately anywhere within as wide an area as can be reached at reasonable cost of transportation. The underlying romance of such a modern institution with respect to readiness-to-serve, promptness, reliability, and withall an improved quality of product, must appeal to the imagination, but awaits a poet's handling for an adequate description.

To accomplish such a service necessitates a complex business. To note how complex, we can mention the fields into which economists divide business activities. Thus five separate fields, under one of which most business endeavors may be classified, are all involved jointly in the ready-mixed business, namely raw material production or commonly called the "extractive" field, the commercial, the manufacturing, the transportation, and the construction fields. Each of these is a component of the ready-mixed business. The two remaining business fields named by economists—the financial and the professional—are not directly parts of the business, though the operator frequently has occasion to serve his customers both as banker and as engineer.

Raw Material Production

We can consider in some detail the portion of the ready-mixed business related to each of these usually independent types of business. First comes the raw material or aggregate production. If the concrete mixing and the aggregate production are operated by the same organization, then the concrete and the raw material branches can appreciate the other's problems. But if the aggregate and concrete are separate businesses, then the concrete mixing is still deeply interested in the aggregate production, because the quality and the cost of the concrete will depend to a marked degree upon the service in aggregates from the sister industry.

Some aggregate producers have appeared slow to recognize that improved quality of concrete—all concrete and not merely the pre-mixed—results from proper grading of both the fine and coarse aggregates, and uniformity in all shipments of each material. Real service and cooperation mean more attention by the producers to this feature, which in some localities may require better screening equipment than was formerly acceptable. But the ready-mixed operation will not deliver to builders the better concrete of which it is capable, unless a supply of uniform aggregates of proper grading is available.

The underlying and dominant characteristic of the ready-mixed business is undoubtedly that of the jobber, commonly called "material dealer." To a large extent the ready-mixed operation distributes materials produced by someone else (cement and aggregates) plus a special service for which a very nominal charge can be made. The problem of material supply, handling of materials, and relations with contractors are much the same as in distributing concrete materials in the common manner. The same materials are delivered merely in a little different form than formerly. Accordingly, some established dealers have installed a concrete mixing operation as an additional department. In other cases, an independent organization for concrete mixing has sprung up, which per-

*Presented before the National Sand and Gravel Association, Memphis, Tennessee, January 30, 1930.

forms all the functions of the ordinary dealer with reference to concrete materials, and therefore merits consideration as a dealer, so long as the mixing operation serves without prejudice all calls from builders and is not operated by or for the special interest of one or a group of active contractors.

Manufacturing

But in addition to this jobbing characteristic, there is a distinct manufacturing feature to the business. The raw aggregates and cement are fabricated into a different product, just as steel mills convert pig-iron into something different. This requires a full understanding and application of the manufacturing is a function quite aside from the ordinary dealer is only casually interested. It involves responsibility for the quality of the materials used, because this affects the quality of the concrete delivered; it necessitates the training of a personnel for special production duties, just as much as the organization of an automobile factory or other manufactory. The commercial production of concrete must be handled efficiently to exist, because the margin between cost of materials and selling price is much narrower than with most manufactured products, as the materials represent roughly 75 per cent of the selling price as compared to the 40 per cent or less with most manufacturing.

In every sense, pre-mixed concrete is a manufactured product, produced under rigid control and delivered to the builder at the site of his work, ready for use. It differs from brick or lumber or steel simply in being perishable. Its semi-liquid consistency facilitates the handling and final placing of this fluid stone. The production of the concrete in a central plant is distinctly a factory and not a construction operation, which should be recognized in the nature of the organization and in the type of personnel employed.

And as the ready-mixed business is new and involves special service features, the sales or merchandising end is quite different from the selling work usually done by the material dealer. Adequate merchandising of this new product requires both educational and advertising activities along the same lines as retailing any specialty. The convenience of using ready-mixed concrete has opened an outlet to householders, institutions, and industrial plants, who formerly either did not make the improvements or let the jobs accumulate until employment of a contractor was justified, but who can now do their own placing of concrete on the simpler work. Consequently, the diversity of sales activities which must be performed in introducing and developing the ready-mixed idea in any community represent a unique merchandising opportunity.

After the concrete is mixed, it must still be delivered, which is a most important feature of the operation. The transportation requirements are exacting—the consistency of the concrete must be suited to the nature of the work, it must reach the job in proper physical condition, when and at the rate wanted by the contractor, and must be delivered in a manner most convenient for the contractor to rehandle into final position. The modern dependable motor truck is the indispensable agency employed. But the moot question is that of the type of body to place on the trucks. Many types of equipment are offered, many ideas are being tried, and some money is being spent in making changes; but all this is a part of the pioneering. As a whole the delivery service is improving steadily, and the contractors' requirements are being served more effectively. So far as the ready-mixed operator is concerned, the truck equipment will usually represent considerably more investment than the plant equipment; it also requires more personnel to operate and more attention to maintain. Hence the transportation end of the business is of grave importance, and the success or failure may lie at this point.

In addition to the factors involved in the mixing and delivering, the ready-mixed operation must be able to dovetail with the local construction practice. This involves more than mere familiarity with the contractor's work; it is frequently possible to make suggestions regarding the delivery and handling of concrete at the job which result in better construction and economies for both the contractor and the vendor of the concrete. Successful application of the pre-mixed idea requires an unusual degree of cooperation between the mixing organization and the contractor's organization. Unless the greatest cordiality and cooperation exists, the delivery of concrete which is itself ideal for a given job, may still not be satisfactory to both parties. This feature reflects back to the perishable nature of the concrete, and hence is inherent with the ready-mixed business. Although the mixing of concrete at the central plant or in trucks is fundamentally manufacturing and not a part of the building operation until the material is delivered, still the tie-in with the construction field is so close that this can also be considered a component in the ready-mixed concrete business.

We thus see that almost the whole gamut of industrial types, which apply singly to most businesses, are all very definitely involved in the handling of ready-mixed concrete. This complexity carries with it a diversity of interest which is quite unique. This also means that the inference conveyed by some of our friends of it being a simple matter to set up a mixer in a material yard or to operate a few mixer-trucks, is by no means the end of the considerations involved in developing a commercial pre-mixed operation.

Central Rock Co., Inc., Operates New Crushed Stone and Concrete Products Plants at Lexington, Ky.

Operations Produce Large Part of Crushed Stone, Building Stone, Concrete Block and Roof Tile Used in Vicinity

By W. E. TRAUFFER

THE Central Rock Company, Inc., of Lexington, Ky., on December 1, 1929, put into operation a very modern and completely equipped crushed stone plant. This plant, which has a capacity of over 500 tons per day, was designed and built by the Smith Engineering Works and Telsmith equipment is used throughout the entire plant.

The plant is located just outside of the city limits of Lexington, 1½ miles west of the heart of the city on the Old Frankfort Pike. The property of 37 acres is all underlaid with limestone to a depth of about 200 ft. and the overburden will average about 2 ft. The rock is entirely free from dirt or clay seams and, while somewhat stratified near the surface, is solid and massive a few feet below.

In common with the famous Blue Grass region in which it is located, the quarry has an interesting history. Operations were first started here soon after the Civil War in producing building stone for which there was considerable demand. Most of the old houses and all of the old stone curbs in Lexington came from this quarry. Some building stone is being produced now as a sideline.

Gasoline shovel stripping overburden while plant is shut down

Stripping of the overburden is done by a North-

Plant from southeast with incline to crusher in foreground. Compressor and storage building at right

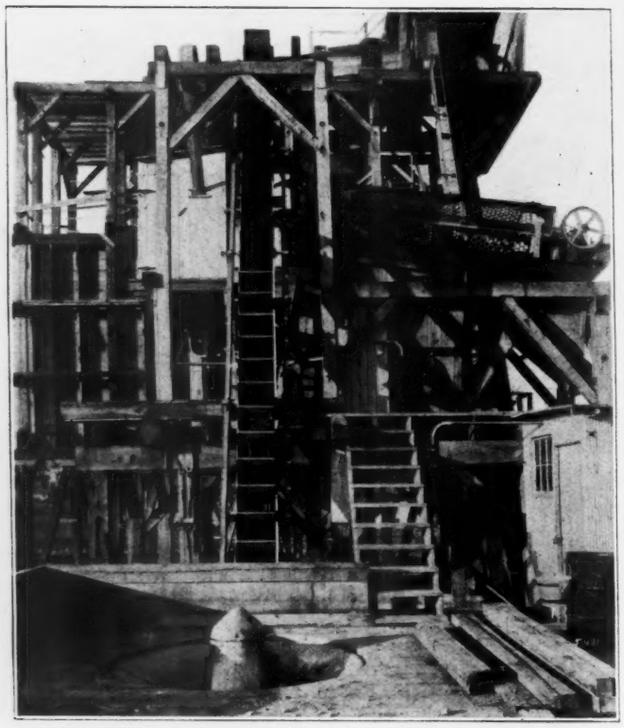
Two of dump-body tractors which haul quarried stone and stripping

west 1-cu. yd. gasoline crawler shovel and the dirt is hauled away in two Hughes-Keenan Co. "Iron Mules" consisting of McCormick-Deering tractors with 2-cu. yd. steel front-dump bodies mounted on them. These haul the dirt to a nearby ravine. The same equipment is used for hauling rock to the plant, stripping being done only in the winter time or when there is a slackening in the demand for crushed stone.

The quarry at present has about a 25-ft. face. Drilling is done with an Ingersoll-Rand X-71 wagon drill with a Little Tugger air hoist using 10, 20 and 30-ft. steel. Single row bank shots are made and 60 per cent dynamite, electrically fired, is used. It is planned to work the quarry in 30-ft. levels after it has been somewhat expanded.

The tractors haul the rock up a dirt incline and discharge directly into the Telsmith 13-A gyratory primary crusher which reduces to 4-in. size. This crusher discharges into a 17-in. belt bucket elevator on 38-ft. centers which takes the material to a 48-in. by 12-ft. Telsmith heavy-duty rotary scalping screen with 1½-in. and 2½-in. perforations. The over 2½-in. stone goes through a chute to a Telsmith No. 40 gyratory reduction crusher. A gate in the chutes from the scalping screen is so arranged that any or all of the stone can be sent to the reduction crusher if desired.

The stone passing through the scalping screen



A close-up of the plant showing the primary crusher, elevators, and screens. The frame building at right houses all motor controls

The wagon mounted drill used in the quarry

and that from the reduction crusher both go to a 17-in. belt bucket elevator on 70-ft. centers which feeds a 48-in. by 22-ft. Telsmith heavy-duty sizing screen with a 6-ft. dust jacket over the bins. This produces six sizes: dust under ⅛-in.; screenings ⅛-in. to ¼-in.; chips ¼-in. to ¾-in.; concrete rock ¾-in. to 1-in.; concrete rock 1-in. to 1½-in.; and road stone 1½-in. to 2½-in.

The three larger sizes are chuted direct to bins. The three smaller sizes go to a Telsmith No. 36 balanced double-deck vibrating screen, the two larger of these sizes being fed to the upper deck and the dust to the lower deck to insure accurate separation. The three sizes are then chuted directly to their bins. The bin structure has a total capacity of 500 tons and is divided into five compartments of equal size. One of these was divided

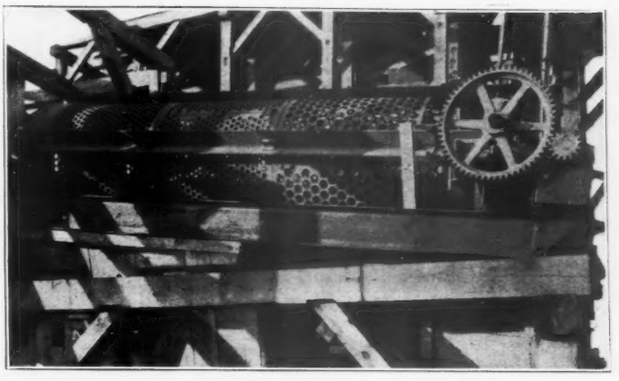
again for the dust and screenings making six compartments in all. Railroad cars are loaded under the bins through twelve Telsmith Duplex 20-in. by 20-in. gates, two to each bin. Trucks are loaded from one side of the bins through Si-Quad gates, one to each bin.

The plant is of simple and compact design with concrete plant and machinery foundations and timber framework and bins. All of the motors are protected from the weather. When the dry season sets in all of the exposed timber will be creosoted for permanence. Although designed for a capacity of 500 tons per day ample provision was made for expansion. The capacity can be doubled by installing an additional reduction crusher, another scalping screen and another vibrating screen. The elevators and sizing screen would require no changes.

The secondary crusher above with chutes feeding from it and scalping screen to elevator to sizing screen

Each unit in the plant is independently driven. Each of the two crushers is Texrope driven by a 50-hp. slip-ring motor. All of the other equipment is belt-driven by squirrel-cage motors, the scalping screen by a 10-hp. motor, the sizing screen by a 15-hp. motor and the vibrating screen by a 3-hp. motor. The elevators both have steel frames and each is driven by a 15-hp. motor. Goodyear ore conveyor belting is used on both elevators, 6-ply on the short elevator and 8-ply on the other.

All motors and electrical equipment were furnished by the General Electric Company. This includes safety switches, oil circuit brakers and controllers for the crusher motors. A small frame building alongside the primary crusher houses the equipment controlling the entire plant. Electric current at 220 volts is used for all operations. Shipments from the plant to date have been entirely by truck, but a 900-ft. siding is now being built from the L. & N. main line between Lexington and Louisville and will be completed soon. Shipments will then be divided about equally between trucks and the railroad. Most of the output is used for concrete and macadam road work within a radius of 80 miles of Lexington.

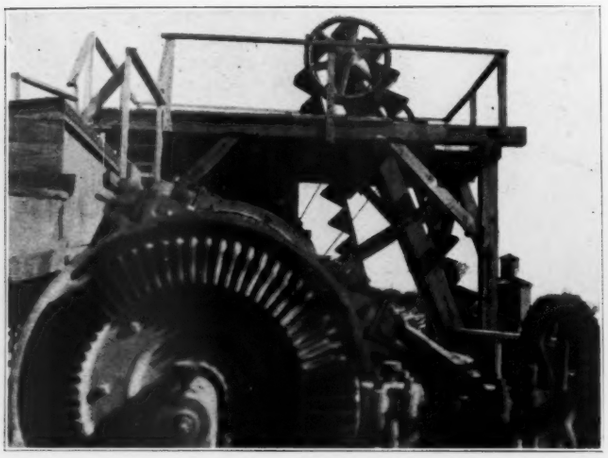


Closeup of the revolving scalping screen showing the gear drive

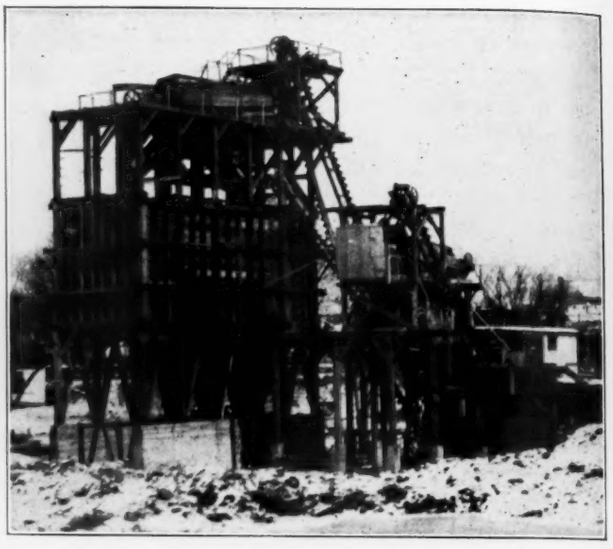
The office of the company is a neat and attractive three-room building on the property. It is built of cut stone quarried on the property of which there is some still being produced. The building has a tile roof, the tile being made in the company's products plant. Trucks are weighed on a Fairbanks 15-ton capacity scale in the office. The cut stone produced is used for foundations, walls and building construction in Lexington and vicinity.

A concrete block building near the plant houses

Closeup of primary gyratory crusher showing chute to bucket elevator



Closeup of revolving sizing screen with discharge from elevator



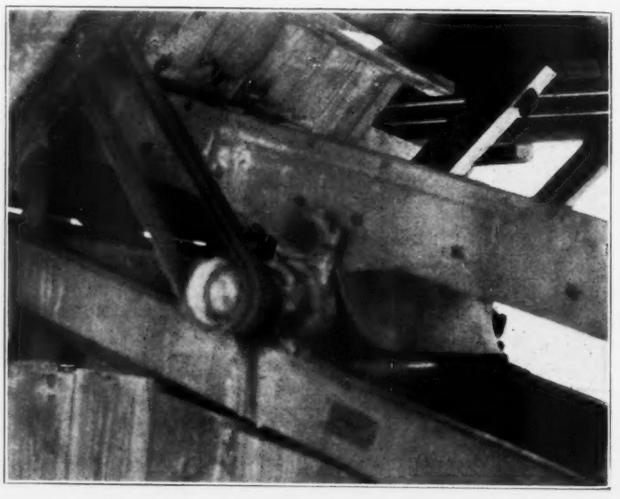
Plant from southwest showing concrete foundations and facilities for loading

an Ingersoll-Rand Imperial Type 10 8-in. by 10-in. by 13-in. two-stage air compressor belt driven by a 75-hp. General Electric synchronous motor. A Reed air filter on the intake of the compressor protects it from undue wear or damage from dust in the air. The other half of the building is used for storage of parts and extra equipment.

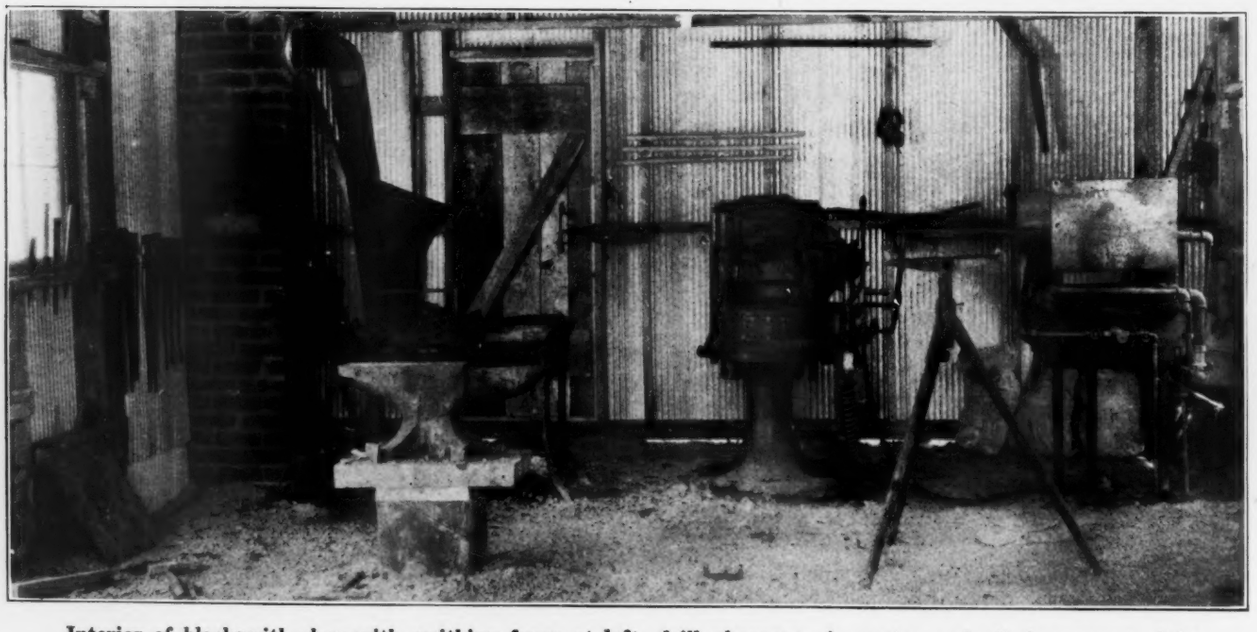
A corrugated metal blacksmith shop contains an Ingersoll-Rand Leyner drill sharpener, a Tate-Jones oil forge, and a smithing forge, as well as other necessary equipment such as an electric drill, anvil, miscellaneous tools and neat racks for tools and small parts.

The Concrete Block Plant

The company also operates a subsidiary called the Lexington Concrete Products Company which manufactures concrete block and tile, roofing tile and other precast work. This plant is located on the Liberty Pike about a mile east of the heart of



The double-deck vibrating screen used for final separation

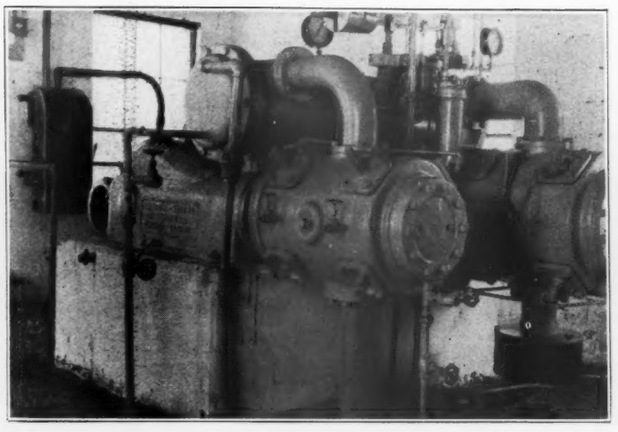


Interior of blacksmith shop with smithing forge at left, drill sharpener in center and oil furnace at right

Left to right: W. B. Isaacs, S. T. Wilson and T. W. Havely

Lexington and went into operation about the same time as the crushed stone plant. Crushed stone is furnished from the stone plant, shipments being made economically by rail as both plants are within the yard limits of Lexington where switching rates apply.

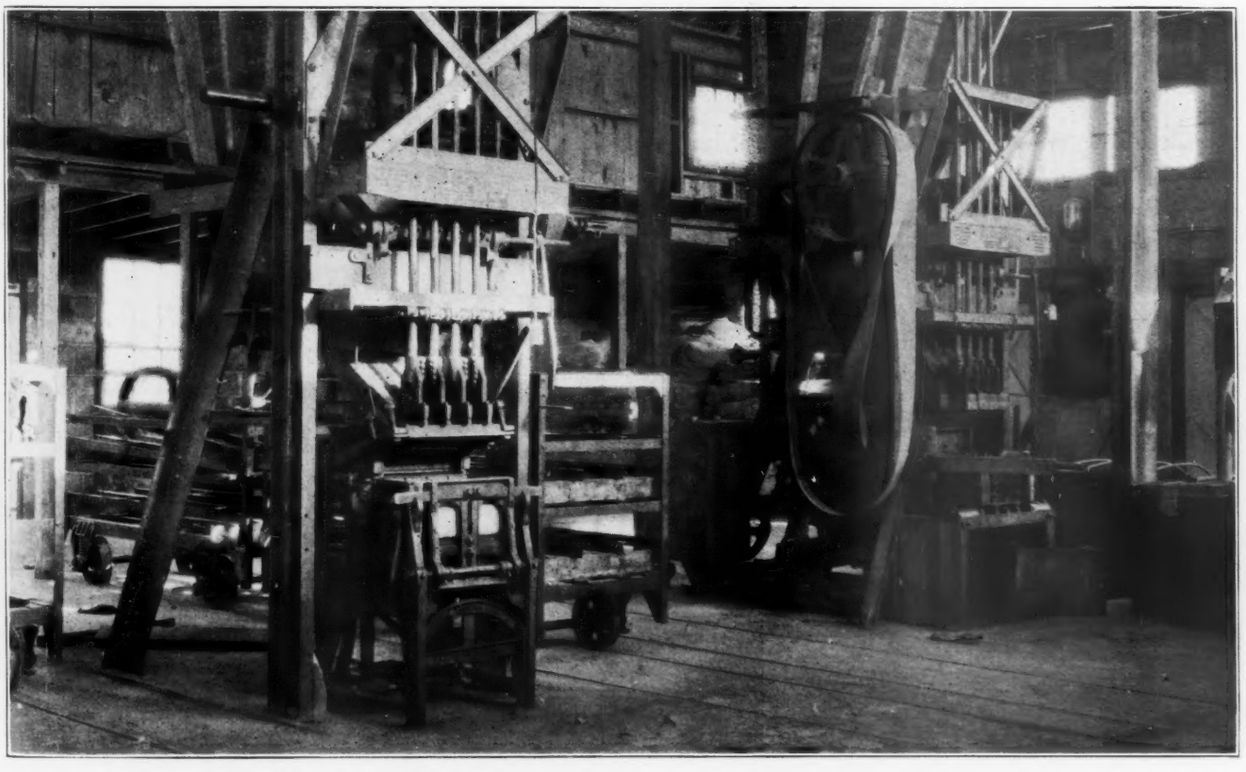
The building is of concrete and concrete block construction and, like the stone plant, was so designed that equipment can be added and the building enlarged without interference to operations.



The air compressor which furnishes air for drilling. Note air filter on intake at right

Great care has been taken to provide good lighting and ventilation. The plant has a daily capacity of 1800 stripper block, 600 face-down block and 300 sq. ft. of roof tile.

Cars of stone are unloaded at the plant by a Northern Conveyor Co. portable belt unloader which discharges through an opening in the building onto a storage pile. The stone is then shoveled by hand into an Ideal 21-ft. horizontal products plant mixer which gives a minimum mix of 9 minutes. The mixer discharges to a bucket handled by a Yale 1-ton hoist traveling on an overhead rail which feeds the concrete to wooden bins over the two Anchor block machines. One of these is a stripper block machine and the other a face-down block machine. The former is also equipped with



Interior of main room at block plant showing the face down block machine at left and stripper block machine at right. Concrete mixer is at extreme right

A closeup of the unusually attractive office in which tile made at the plant and stone cut in the quarry were used

an attachment which has a capacity of about 4,000 partition tile per day. All of the tile is loaded onto cars which are run into the steam curing rooms. A 9-cu. ft. special mixer in an adjoining room is used for specialties and roof tile. A movable yard track facilitates outdoor storage of the block. The two mixers, two block machines and other equipment in this plant were furnished by the Consolidated Concrete Machinery Corporation.

The curing rooms have concrete walls, floors, and ceilings which insure even temperatures at all times. The end walls of this room and the block room are so constructed that the rooms can be easily enlarged when desired. In case overhead mixing ever becomes necessary, this can be provided for at a minimum of expense as the roof truss stringers were designed with this in mind.

Miscellaneous

No delivery trucks are owned by the company as the products of both plants are sold only to dealers and contractors who can buy direct. The location of the plants within the switching limits allow local shipments in large quantities to be made by rail. Officers of the Central Rock Co., Inc., are:

The small concrete mixer used for special work

Concrete block plant with yard storage and curing rooms in foreground

T. W. Havely, president; E. W. Ripy, vice-president; and W. B. Isaacs, secretary and treasurer. Officers of the Lexington Concrete Products Co. are: W. B. Isaacs, president; Silas Wilson, vice-president; and T. W. Havely, secretary and treasurer.

Classes and Uses of Fire Clays

Fire clays are clays that withstand high temperatures and usually are not fusible below about 3,000 degrees Fahrenheit (cone 27 or 28), says the United States Bureau of Mines, Department of Commerce, in Information Circular 6,155, recently published. The term is used loosely, however, and almost all plastic clays found below coal seams, whether or not they are refractory, are likely to be called fire clay. Even true fire clays vary widely in all their properties. In an effort to bring order out of this chaos, the American Society for Testing Materials distinguishes: (1) High heat duty fire brick (divided according to composition into clay fire brick and siliceous-clay fire brick, of which the former has a higher pyrometric cone equivalent); (2) intermediate heat duty brick (cone 28); (3) moderate heat duty brick (cone 26); and (4) low heat duty brick (cone 19).

The main use for fire clays is for the manufacture of the different shapes of fire brick, but they are also used either alone or mixed with other clays in refractory cements, gas or zinc retorts, furnace or locomotive linings, crucibles, coke-oven brick, saggers, and other refractory products, and in addition considerable quantities are used in the production of floor tiles and sanitary ware, stoneware, terra cotta, conduits, pressed and paving bricks, portland cement, plaster, etc. Fire clays may be residual, but more often the commercial deposits are of sedimentary origin. The most important domestic sources are formations of Carboniferous age in Ohio, Pennsylvania, Kentucky, Indiana, Illinois, Maryland, West Virginia, and Missouri, but fire clays are found also in Cretaceous and Tertiary beds in various parts of the country.

Road Building During the Next Decade Offers Unusual Possibilities*

By W. C. MARKHAM,
Executive Secretary, American Association of State Highway Officials

IT HAS been said that "coming events cast their shadows before," but as we move along life's highway we are impressed with the fact that this was said long before present methods were used in signalizing social, political or economic events. Today there are no predictions of "casting shadows" but rather a clear and definite automobile headlight showing the way. This is particularly true if we are forging ahead, for then there are no glaring reflectors to obscure the ever enlarging landscape.

Ten Years in Retrospect

In order that we may visualize or prophesy what the road building situation in this country will be during the next ten years, it is highly necessary that we pause in retrospect to summarize what has been accomplished during the past decade. Ten years ago there were a little over 6,000,000 motor vehicles in this country. The amount of mileage of improved roads on the State Systems at that time was a little over 40,000 and the amount of improved mileage outside of the State Systems was so small that we do not have a definite record. Today there are almost 26,000,000 motor vehicles on our highways and the states have improved the mileage of state roads to 182,000 and the county mileage is now definitely known to be a little over 432,000 miles. In order that we should not become boastful of our accomplishments, we should realize that the surfaced mileage of all kinds hardly more than equals 20 per cent of the total road mileage in this country. Ten years ago the owner of a car paid an average of $8.25 per car for the privilege of driving upon the highways; today the average cost per car for the same privilege is about $30.00. While the motor user during these ten years has increased his annual contribution to roads something over three-fold, the surfaced mileage on the State Systems have increased almost five-fold, and the surfaced roads on the county systems have been increased almost ninety-fold.

A concrete illustration of the wonderful development in rural highway improvement during this period can be realized by observing the changes in one of the middle western states which is indicative of a vast majority of the states in the entire country. Ten years ago in Iowa there were but 24 miles of paved roads in the entire State and this was from Des Moines to Camp Dodge and was built during the War to connect the State Capital with that cantonment. At the same time, while there were short pieces of gravel road radiating from numerous county seats, there was but one place in the entire State where the gravel road was long enough to connect two county seats, and that was in the extreme northwestern corner of the State. Today, there are five roads east and west and two roads north and south surfaced entirely across the State.

The Federal Government a decade ago paid to the States $575,000 to aid in building an interstate system of highways and last year the Federal contribution was a little over $80,000,000, but because of the economic and social necessity for these improved highways, the states have improved a larger mileage of roads on this system without Federal cooperation than with that assistance. The Federal treasury is $500,000,000 to the good because of that situation and the states know that there will be no reimbursement, but this does not warrant those in authority over Federal affairs to berate the state officials because of increased state expenditures, but rather intensifies the argument for increased Federal appropriations.

Last year the states expended over a billion dollars on state roads alone and the counties and townships paid out an equal amount. Uncle Sam's contribution was but 5 per cent of the total road expenditure.

If it were not for the roads and the schools it would not cost much to run the states, but the wealth of the states depends upon the kind of schools and roads they maintain.

To accomplish all this, has taken some money. To continue the program, will take even more money; for, in many instances, the needs will require an increased outlay. Present sources have a very definite bearing on future expenditures.

There seems to be a general impression over the country that the auto license fee and the gasoline tax, together with the Federal funds, are the complete source of supply for income in state highway improvements, but this is not the case. These are the major sources, it is true, but last year they furnished but 67.8 per cent of the entire amount in the Nation as a whole and there is a great variation between the states.

One State Highway Department, Montana, does not receive a penny from the motor license fees, while the remaining states range from 3.5 per cent in Mississippi to 72.4 per cent in Massachusetts.

* Read at annual convention, National Sand and Gravel Association, Memphis, Jan. 30, 1930.

While Illinois, New York and Massachusetts received no funds from the gasoline tax—although they will in the future—the remaining states ranged from 9.8 per cent in Vermont to 61.4 per cent in California.

Some time since I called attention of the State Legislature to the fact that *method* of raising the license fee seemed to have no connection with the amount secured. To illustrate: fourteen states use horse power and yet the rate varies from $19.88 per vehicle to $6.84. As a basic principle, each state law ought to have a minimum rate per car, and most of them do, but there is no justification in the minimum rate ranging from $4 to $15 per car. Not a single state legislature during the past year made any effort to rectify this situation. The only thing attempted in any state was to reduce the license fee on the ground of an increased gas tax. And this was done in at least two states.

It is conceded by all state highway departments that the requirement of local funds to assist the states in building roads is unsound and yet the average receipts from this source last year was 10.1 per cent. There were eight states which received no local funds. The others ranged from .1 per cent to 62.8 per cent. Receipts from state tax levy, direct appropriations and miscellaneous sources totaled 8 per cent while the Federal funds averaged 9.6 per cent.

If I might hazard an opinion as to how the funds for state highways should be divided, I would say, 10 per cent from a general levy on all property, 20 per cent from Federal funds and the remaining 70 per cent from motor license fees and a gasoline tax, distributed according to local conditions. At present a tax levy, appropriations and miscellaneous receipts almost equal the 10 per cent of a general levy. All wealth receives some benefit from these public improvements and should contribute this small per cent, thus eliminating the other methods now used, including local funds.

Now that the theory of a gas tax is seemingly well entrenched as a justifiable method of securing funds for road building, and the rate is being gradually increased, there is a disposition in some localities to curtail or almost entirely eliminate the auto license fee. It might be well for these people to realize that the gas tax can reach a point where the increase will not be productive of increased total receipts and the states of the northern part of the country should realize that a license fee is a fixed amount without regard to climatic conditions.

That there is justice in the argument that, with the retention of the motor license and gas tax, the motor vehicle should be exempted from personal property taxation, has been accepted by 13 states. This is a matter that should receive serious consideration by all the states. While there may be a few cars which, for a time, escape the license fee, none can escape the gas tax. It is a notorious fact, however, that the property tax, to use polite language is very unequally administered, and in many instances is entirely ignored. Entire elimination of the property tax, which in most cases does not go for road purposes anyway, should be recommended to the states which have not already abandoned this plan of taxation.

At the present rate of road construction, it will be 8 years before the state road systems have been given the "once over" with any kind of even temporary surfacing. By that time, some of the cheaper types will have had such abuse by the traffic that they will be ready for a "twice over." The average wealth per mile of the state systems of highways is $1,000,000. We are financing these roads with motor license fees and a gas tax. Number of motor vehicles go along with wealth; and so if our wealth were equally distributed, the problem would solve itself. But a state which has 437 cars per mile of the State System is on "Easy Street" for funds in comparison to the state which has but 7 cars to the mile. Some roads are of national importance whether the states through which they pass have the wealth to construct them or not.

If we are going to build these interstate roads with funds from motor license fees and a gasoline tax, where is the equity in having a license fee of $25 per cer in one state while the inhabitant of an adjoining state pays but $5? Why should the gas tax be 6 cents per gallon in one state and 2 cents in another?

It should be noted in passing that receipts for motor fees last year were $719,966 less than the preceding year, although the car registration showed an increase of 1,477,489 cars.

Road Expenditures

A study of state highway expenditures also shows quite a variety of conditions. The whole situation must be based upon what definitions are set up in the accounting departments of the several states. To illustrate: some states charge to "maintenance" items that others check against "construction." In six states the items of construction and maintenance are almost equal. There are thirteen states which charge up every item to one of four main heads while the others carry a "miscellaneous" column.

Of course the main item of expenditures is "construction," and rightly so, at least in what may be called the "newer" states. And yet we find "maintenance" is charged with as high as 47.7 per cent of the total expenditures. Where the road improvement work is a rather recent undertaking, we find that construction has absorbed as much as 86.2 per cent of the entire outlay.

The time will come when the amount expended for "maintenance" will, in a degree, be a measure as to the quality of construction. Those who oppose bond issues will scrutinize very closely the percentage that interest on bonds is to the total annual outlay. Last year five states paid out more for interest on bonds than for maintenance. Evidently these states preferred to spend money for interest on a good pavement rather than to pay out for "maintenance" and still have no dependable road surface.

The Federal expenditures for roads were .6 of one per cent of all government expenditures, the state expenditures 4.2 per cent of all governmental expenditures and the county and other local, 5.2 per cent of all governmental expenditures, or in other words, the total expenditures on all highways (outside of cities, national forests and parks) was 10 per cent of all governmental expenditures throughout the country.

Viewed from another standpoint, the Federal expenditures for roads were 1.9 per cent of all Federal expenditures, the State expenditures for roads was 33 1/3 per cent of all state expenditures and the county and other local expenditures for roads were equal to 9.3 per cent of the remaining expenditures in the states or about 20 per cent of all remaining expenditures outside of cities having a population of ever 30,000.

The Bureau of the Census placed a value on the registered motor vehicles of this country last year at $10,400,000,000 and Moody's of New York estimates the total automotive expenditures that year at $12,000,000,000. And so we had $22,400,000,000 tied up in highway transportation. As careful business men, do we spend enough to properly protect this investment?

The Future Road Program

Because of the great variety of local conditions in this country we should study the road building program by localities rather than set down a general principle for the entire country, as to what would be the most advantageous thing to do during the next decade. Naturally the first and most important item is to see that the state systems are surfaced as rapidly as possible. This will not only give immediate service to 75 per cent of the users of the highways but will also enable the local communities to improve the feeder roads more rapidly. There are some states in which this program will be as much as can be accomplished during the next decade, but in others the program will be vastly different.

A few states have already surfaced what would be a normal state system, but much of this surfacing is of an obsolete class; and, in fact, was not constructed to carry the loads now imposed upon it. In these cases, a large amount of the funds available will be used for reconstruction and, in reconstructing these roads, the states will be compelled to widen the pavement considerably. New York has set the example of taking over the entire county system of roads for improvement and doubtless other states in the same neighborhood will soon follow.

Elimination of Railroad Crossings

The state construction programs have always been involved in the question of highway safety and while the percentage of fatalities at railroad grade grossings is less than 10 per cent of the total of highway accidents, yet the elimination of railroad grade crossings is a vital matter and will be uppermost in the consideration of the programs in a number of the states. New York again has led the way by authorizing a bond issue of $300,000,000 to be used exclusively for railroad grade elimination. New Jersey is now contemplating an increase of one cent to the gas tax, the two-cent rate now obtains, to secure funds to be used exclusively for railroad grade crossing eliminations. Last year in the entire country there were 1,000 crossings eliminated on the state systems alone, a majority of them being accomplished by a relocation of the road. At this point I want to say that the most discouraging feature of this important plan of reducing hazards upon the highway is the bitter opposition of local people to the relocation of roads. They seem determined to make the improved highway keep its old location even although this improvement naturally will increase the traffic on the road and greatly decrease the life hazard.

Widened Lanes of Traffic

Traffic congestion is not only a matter of personal irritation but also one of great economic loss in many localities. The next decade will see wonderful changes made in the construction work by the widening of the road so that there will be four lanes of traffic and there will be many instances where important state and interstate highways will cross each other in outlying districts instead of in the cities, and the intersections will be planned the same as now obtains in railroad and highway intersections. A splendid example of this is the intersection of Highway Routes No. 25 and No. 4 in New Jersey, where by a cleverly designed system of curve connections all turns both left and right are accomplished, while vehicles are always keeping to the right. The main lines are constructed by a definite grade separation. The entire intersection occupies a forty acre tract of land but, because these roads are both very heavily traveled, it is considered an economical expenditure of funds.

Airport Connections

In the establishment of air transportation the time element is the sole purpose in using this method as far as economics is concerned. Therefore the construction of airports as to location and proximity to highways is exceedingly important. While the percentage of patronage of this method of transportation in comparison to the highway or rail transportation will probably not be very large during the next decade, it is an element that must be considered and special roads leading to and from airports will have to be planned in many localities.

Freight Deliveries

It has been demonstrated beyond a doubt that freight transportation over the highway is not an economical method beyond an average radius of 50 miles, but railroad terminals for freight will doubtless be moved from many of the congested centers and this will necessitate overhead highways for the rapid delivery of freight in packages to the retail sections of the cities. As the connection of these terminals in their location to city streets are involved, the states will be compelled to cooperate with the City Planning organizations in meeting this situation.

We hear about two new business blocks in New York to be 84 and 86 stories high, respectively, and the Detroit real estate salesmen will soon be talking about a 92 story building in that city. This means such a great concentration of people in one locality that it will take triple deck highways to take care of the traffic. If the men who are erecting these towers of Babel were compelled to contribute largely toward the expense of erecting the super-highways which this building construction will necessitate, there would be a visible decline in the skyscraper business.

State System Satisfactory

A number of efforts have been made, as expressed in bills introduced in Congress, to create what are called "Express Highways," as a distinctive system from those already established. It is hardly probable, however, that they will be given serious consideration at the present time. The present state system, with the additional construction of bypasses around the large centers of population, will in most cases provide the transportation desired without the enormous expense of new right-of-way.

Federal Funds for State Systems

The contention of those who are asking the Federal Government to make additional appropriations for secondary roads exclusive of those on the state systems is hardly appropriate at this time, despite their very laudable anxiety to get, more rapidly, a larger mileage of improved highways. This is true, not only because the ratio of improvement between the primary and secondary roads, so called, is not adverse to the secondary roads, but it should also be borne in mind that the state systems are hardly more than 50 per cent surfaced and admittedly the bulk of the highway traffic is limited to the state systems.

There are millions of people who believe that the Federal Government should make a larger appropriation for highways than is now in the budget, but in view of the status of road building as it now exists, any additional Federal funds which the Congress may deem wise to appropriate should be applied *first* to the surfacing of the Federal Aid System, which was authorized by the Congress itself.

Roadside Beautification

While great stress has been laid upon the necessity for road construction purely from the utilitarian viewpoint, the facts are that the use of the road as a matter of recreation and visitation is a very important item. This naturally has brought on the problem of providing for the general comfort of the traveling public as well as the beautification of the roadside, so as to make more enjoyable this method of travel. The Federal Government, realizing this, has already provided that the Federal funds which now go to the states for road construction may be used for roadside beautification, naturally having in mind tree culture principally. Several of the states have begun work on an elaborate scale for the beautification of the right-of-way and in many instances have purchased small tracts of land and established parks at frequent intervals. This aesthetic feature, in connection with highway transportation, will be greatly advanced during the next few years and it will not be long until every state highway department will have employees expert in this line of work.

Conclusion

The man at the wheel sees highway development in terms of reduced transportation costs, the civil engineer reckons it in durability of pavement and perfection of design, the school teacher envisions enlarged educational privileges for the childlife of the countryside, the civic worker dreams of dissipation of sordid congestion in smoky cities, the merchant hopes for an increased rural patronage, the farmer expects an enlarged and stabilized market for his products and the man who furnishes the material to build the highways has a just pride in the service which his product affords. Let us hope that the results at the end of the next decade will be pleasing to all of them.

Review of Injuries in Quarrying and Crushing Operations*

By W. W. ADAMS,
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FROM a safety point of view, the calendar year 1928, which is the latest period for which complete figures are available, was the best year in the history of the quarrying and related industries. Although the volume of work done was equal to that of the preceding year, accidents were fewer in number than ever before. Both the death rate and the injury rate were reduced, not only below the previous year's level but also below that of any previous year. Nearly all of the States participated in the improvement. Reports from operating companies showed reduced accident rates in 22 out of the 27 states for which separate figures were compiled.

Bureau of Mines Collects Data

The United States Bureau of Mines receives annual reports of accidents from all producers of stone except those in the sand and gravel industry. Our reports cover not only the quarrying of the rock but they also include such other operations as crushing, stone-dressing, and the manufacture of lime and cement. Each of these groups, except lime, reported a better safety record in 1928 than in the year before. What the year 1929 will reveal we do not know but there has been nothing thus far to suggest a set-back to the improvement which the record of last year might lead us to expect.

Looking at the industry as a whole, there were 90,000 men employed last year. A little more than half of these worked in the quarries and the remainder were employed in crushing or dressing the stone or in making cement or lime. It is not surprising to find that the cement mills had the lowest accident rates for any of these groups. It is only suggesting the idea of cause and effect to say that the Portland Cement Association and its member companies have for many years waged an intensive campaign for safety and that the enviable record of the cement industry is a natural result of that work. Equal success in the safety movement can doubtless be achieved by other industrial groups provided equally sincere and intelligent effort is directed to that end. It is encouraging to find two other associations now specializing in safety. They are the National Crushed Stone Association and the National Sand and Gravel Association. If these two associations and their members meet with the same success as that which has been met with by the cement people, a great improvement in the whole quarrying industry will be made and, it would seem, the right to a corresponding reduction in the cost of accident insurance will have been earned.

Operators' reports to the Bureau of Mines are classified into seven main groups. These are based chiefly on the kind of stone produced. Every one of the seven groups had a better safety record last year than they had the year before. The net result for all establishments represented an actual reduction of 16 in the number of deaths and 2,891 in the number of lost-time injuries. The fatality rate was reduced 10 per cent and the injury rate 20 per cent. Just a few figures will show how this improvement was shared by all kinds of quarries. In the cement industry, for example, the quarries and mills reduced their accident-frequency rate per thousand 300 day workers from 70 in 1927 to 50 in 1928; the limestone industry not included in the previous group reduced its frequency rate from 212 to 168; traprock quarries from 254 to 208; granite from 220 to 183; marble from 126 to 111; sandstone from 192 to 162; and slate from 186 to 160. All of these groups together reduced their accident rate from 165 to 131. It was the cement and marble industries, to a large extent, that kept the combined rates for all groups to such low levels.

Underground Accidents

A comparatively new type of quarry work—one that has developed rapidly during the past 6 or 7 years—is underground quarrying or mining. Some of you may be engaged in work of that kind. Our statistics for underground quarries are not very elaborate, but last year we received returns from 93 quarries in which 3,800 men were employed underground. Most of these quarries produced limestone. Their accident rate last year was 133 per thousand men employed, representing a slight improvement over the previous year's rate of 136. There is no other large group of underground mining operations that has so good a safety record, unless it be among the non-metallics, possibly gypsum, as to which I have no separate figures at present. Even the very favorable accident rates for underground iron mining, an industry which is well organized and highly efficient in safety work, are surpassed by the still more favorable rates for underground quarries.

*Paper presented before the Eighteenth Annual Safety Congress.

An enumeration of the principal causes of accidents last year is a recital of facts which you already know. The familiar causes did not change their relative positions of importance. Falls or slides of rock or overburden, and accidents due to explosives, haulage, and falls of persons continued to be the chief causes of death. (Incidentally, I may say that the quarry industry uses about 75 million pounds of explosives a year.) Most of the non-fatal injuries were due to flying objects, handling rock at the face, falls or slides of rock or overburden, haulage equipment, machinery and falls of persons. The significant thing, however, is not the enumeration of these causes, but the fact that all but 2 out of 26 classes into which our statistic of accidents are divided, represented an improvement over the preceding year. The only exceptions were handling rock at the quarry face and handling rock outside of the quarry. Each of these two classes showed a net increase in 1928. The increase was limited to permanent partial injuries and to temporary injuries of more than 14 days' duration; there was an actual reduction in the number of temporary injuries of less than 14 days' duration.

Definite Progress in Safety

The foregoing general view of last year's safety record is intended to show the net results of what the quarry industry has done in the field of accident prevention. Much remains to be done, of course, but it is well to realize that past efforts have brought definite progress and that the industry is headed in the right direction.

One of the most hopeful signs of the times is the growing evidence of the realization on the part of management, not only in quarrying but in other industries, that safety and production should go hand in hand, and that both require the personal attention of the chief officers of the organization. This has always been the view of some of the leading companies, and I believe that the acceptance and spread of this idea have contributed largely to the progress that has already been made. No lessening of the individual workman's responsibility would be advisable, but the growing interest of management in accident-prevention work is encouraging. This is just another way of saying that safety work will advance most rapidly when every man in the organization directs his efforts toward a common objective.

Lost-Time Accident Reports

With nation-wide statistics as a background, the Bureau of Mines is preparing to make a more intensive statistical study of quarry accidents. This study is to be based on the accident reports which are sent to us by the quarry companies that are participating in the National Safety Competition. Each company sends us a separate and complete report of every lost-time accident. This usually takes the form of a carbon copy of the accident report which the company is required to send to the State industrial accident commission. We now have a four-year accumulation of accident reports of this kind. They have not been subjected to any elaborate classification as yet, because it was necessary first to obtain a sufficient number to form a reliable basis for building a standard classification of the detailed causes of quarry accidents, a standard classification of the occupations of the men who work in the quarries, and a standard terminology for the places or locations within the quarries where accidents may occur. These standards will make it possible to prepare more helpful statistics of quarry accidents. They will help us answer the questions as to how, why, and where the accidents occur and who gets hurt when they occur. What are the relative risks of the different occupations among quarry workers? Where do most of the accidents occur? Do frequency and severity run parallel to each other? If not, in what classes of accidents do they differ? These are some of the questions that should be answered, and the answers should be made available to the whole industry. Your chairman, Mr. Colville, and your secretary, Mr. Boyd, are already co-operating in the formulation of these standards. Their co-operation during the past year is appreciated and its continuance during the coming year is desired. Special acknowledgment is due to the companies who are sending detailed reports of accidents to the Bureau of Mines in connection with the National Safety Competition. These companies are naturally desirous of improving their own safety records and, if possible, winning first place in the contest in which they are engaged, but underlying it all, even if incidental to their main objective, they are laying a foundation for a more intensive study of quarry accidents than has heretofore been possible. Information which these companies are making it possible to obtain will serve as a spotlight to further illumine the nation-wide and therefore more general accident records which cover the entire quarry industry.

It may not be generally known that the quarrying industry is one of the four or five industries in the United States for which complete statistics of accidents are available. Through the co-operation of the companies, annual statistics of accidents are now available from 1911 to the present time. Last year's safety record was the best in the history of the industry, but let us hope it was only a new point from which future progress may be measured.

Economic Factors in the Development of Sand and Gravel Projects

WHILE the production of sand gravel in this country has shown a tremendous increase in recent years and the construction program of the Nation will naturally call for enormous quantities of these materials in the future, there are various economic factors in the development of new sand and gravel projects which should be given serious consideration by the operator if financial profit is to be assured, says the United States Bureau of Mines, Department of Commerce.

At the present rate our sand and gravel reserves are being depleted at the rate of more than 4,000 acres per year, states J. R. Thoenen in Economic Paper 7, just published by the Bureau of Mines. This would be infinitesimal if all the area known to contain sand and gravel were composed of commercial deposits. Much of this area is known to be patchy, as small deposits of good material are mixed with larger deposits of low-grade material. Also, much of it is at too great a distance from consuming centers, but as new roads and railroads are built it will become accessible to markets of the future.

Such a large increase in volume in any industry would inevitably encourage the development of new production either in the expansion of going concerns, the starting of new operations, or both. The apparent ease with which new sand and gravel operations can be started greatly facilitates this expansion.

Sudden and rapid expansion has undoubtedly resulted in the creation of new projects in the sand and gravel business without adequate study of economic conditions. A survey of the situation made by the Bureau of Mines indicates that production over the whole country has not yet reached saturation. Curves for individual states, however, tell a different story and indicate that the local situation is rapidly approaching a condition of saturation, if not overproduction.

Formation of Deposits

Sand and gravel are disintegrated products of various rocks. Disintegration starts with the solution of various mineral constituents of the rock by surface waters and is assisted by the disruptive action of freezing. Abrasion during transportation by running water and glaciers continues the crumbling and results in fragmentation ranging from boulders to fine silt.

Sand and gravel transported by running water would be more or less classified into sizes were it not for the complications induced by flood conditions. Even then such deposits often exhibit decided differentiation in sizing.

Glacial action, on the other hand, by carrying a heterogeneous assortment of material and depositing it all in one locality, leaves a complicated mass of all kinds and sizes of material. The origin of any local deposit, therefore, is of considerable economic significance.

Geologic Reports Available

Where a demand for a certain class of sand or gravel exists without adequate supply, perusal of state or national geologic reports may uncover a nearby source. Study of these reports may also uncover information pointing to certain characteristics of a deposit rendering it applicable to specialized market. By obtaining the geologic reports covering a particular vicinity one may learn whether a sand and gravel deposit is of glacial or stream origin, and, therefore, whether it is apt to contain a partly classified product or a heterogeneous mixture of all sizes and classes of material. If of stream origin, it may contain sands peculiarly suited to certain special markets. If of glacial occurrence, further exploration for a special kind of material may be useless, and thus considerable time and expense may be saved.

The beds of streams, lakes, and oceans form potential sources for sand and gravel and a large proportion of our production comes from such sources. A search along the banks of streams or lake and ocean beaches is entirely in order for preliminary survey. Dredging operations many times divulge workable deposits. In streams, sand and gravel deposits are most likely found on the inner side of bends and may often form the bank on that side.

In searching for sand and gravel deposits one can not confine his hunt to bodies of water, however, and many sand and gravel deposits, while originally water formed, were deposited so long ago that all evidence of the depositing agency has vanished. Here again a study of geologic data is invaluable. The geologist, from his general knowledge and specific studies, can trace the courses of prehistoric rivers and predict the occurrence of gravel deposits.

The quality of any particular deposit depends on the origin of the materials that compose it and also the distance and manner of travel. Thus, glacial action may have carried quantities of the harder rocks, such as basalt, granite, and quartzite.

for a long distance and then picked up sandstone, limestone, and shale, mixing them unevenly and depositing them together.

Sand and Gravel Markets

Probably the four largest markets for sand and gravel are for use as concrete aggregate, road material, railroad ballast, and building sand.

The suitability of the product for a concrete aggregate depends on the nature of the construction. Large massive foundations do not require as careful and elaborate specifications as reinforced concrete building construction.

Engineers are as exacting in concrete road work as in reinforced concrete building constructions as to aggregate specifications. The prospective producer must make careful inquiries and find out the particular requirements of the territory he desires to serve.

Sand and gravel is used in three ways as a road material: (1) As a concrete aggregate; (2) mixed with some bituminous material; and (3) in the raw state for gravel roads or as a subbase for other surface material.

A large percentage of the gravel produced is used as railroad ballast. The various roads differ considerably in their specifications for this material, some requiring a washed gravel and others accepting bank-run material containing considerable clay.

Building sand is usually classified as material passing a ¼-in. screen, but recently engineers have become more critical, and the finer particles or dust must first be removed by a suitable washing process or some other method. The shape of the sand grains is sometimes specified, rounded or weathered grains being preferred to sharp-edged or angular material, and vice versa, although this applies more to special sands. Specifications for building sand at the present time almost universally require washed material.

The demand for an adequate supply of sanitary water for domestic purposes in cities and rural communities has created a large market for certain classes of sands suitable for filter purposes. These sands should be of uniform grain size within certain limits so as to allow a maximum pore space for rapid filtration. They should also conform to certain chemical requirements, as certain mineral constituents possess better filtration properties than others.

Brass and steel foundries require large amounts of molding sand which must satisfy another set of specifications both as to grain size and composition. Also, molding sands for iron and steel differ in certain respects from those used for brass.

Other special sands, either because of special treatment of one kind or another, or because of their chemical composition, are peculiarly adapted to certain uses. Examples of these are glass sands used in the manufacture of window, plate and bottle glass, and engine sands used in large quantities by railroads and electric line.

Economic Factors

Before he enters the business the prospective sand and gravel operator should investigate and assure himself with regard to all the following points:

The deposit should be sufficiently large and uniform.

The market should be able to absorb the proposed tonnage in addition to that which will be furnished by existing sources of supply.

The deposit should yield material of a character that the market will accept or it can be made to do so economically.

The current prices and probable demands should be such as to indicate that the product can be sold for enough to cover not only operating but also overhead costs and in addition should yield a reasonable profit.

The method of excavation chosen should be economically suited to local conditions.

Enough capital should be available to cover initial investments in land and equipment and also to provide working capital during the early stages of operation.

Further information is given in Bureau of Mines Economic Paper 7, "Economics of New Sand and Gravel Developments," which may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at a price of 15 cents.

Calcination of Texas Polyhalite

The behavior of Texas polyhalite (a complex salt composed of potassium, magnesium, and calcium sulfates with 6 per cent water of crystallization) upon calcination is one of the important factors involved in several processes for the extraction of potash from this material. A detailed investigation of the calcination of polyhalite has been made by the Non-Metallic Minerals Experiment Station of the United States Bureau of Mines, Department of Commerce, in co-operation with Rutgers University at New Brunswick, N. J.

Commercial Micas

Muscovite and phlogopite are the micas of commerce. Both varieties occur in comparative abundance and are found in crystals or "books" of sufficient size to yield fairly large sheets. They also possess the transparency and dielectric strength which are the most desirable properties of mica. The other varieties of mica do not possess the qualifications necessary for industrial use in the same fields in which muscovite and phlogopite are employed although some of them have other characteristics that have brought them into a limited commercial use.

Safety Through the Eyes*

By H. F. YOTTER,
Insurance Supervisor, General Crushed Stone Company, Easton, Pa.

A YEAR ago at the Annual Congress of the National Safety Council held in New York City the Stone division of the Quarry Section instituted the Safety Poster Committee. Up to that time the only posters issued by the Quarry Section had been produced by the Cement division. Our section is privileged to produce 12 safety posters a year, the Cement and Stone divisions alternating each month in releasing a poster covering some hazard encountered in our industry.

During this year our division has issued four posters dealing with quarry hazards, copies of which you will find posted in this room. The Cement division has produced a number of posters as well, which you will also see displayed here. Most of the hazards of these two industries are similar and the majority of the posters issued by the Cement division will be found applicable to our work. Material for additional posters is in the hands of the Poster Division of the National Safety Council to publish only six posters a year, and it is our hope that before long we may be privileged to increase this to a poster each month.

Posters are an important and effective factor in the general problem of accident prevention. The constant bringing to the attention of workers the perils of our industry and impressing them with the risks with which they come in contact from time to time surely has its value, and if presented in an attractive and interesting manner is productive of good results. The impressions created by these posters is evidenced by the fact that as the men notice the display of a poster depicting some danger which threatens them in their particular duties they frequently make it a point to secure such posters and place them in some location close to their work as a constant reminder. You have doubtless noticed from time to time that your workmen have shown this interest in posters which illustrate some dangers to which they realize they themselves are exposed.

The variety of posters is practically unlimited. Illustrated posters attract the attention of men more readily than those which do not contain illustrations. Pictures are a language understood by every one. Drawings have their value, but photographic illustrations are usually more convincing, as they impress those viewing them as picturing an actual happening, and not merely being the expression of an artist's imagination, however accurate his design.

Some men may be so unimpressionable as to have their interest aroused only through the gruesome type of picture. There has been some objection to this form of poster but if the illustration is not overdrawn or exaggerated we have found it distinctly advisable to include them in our exhibits. If an unsafe practice is so self-evident as to leave no doubt in the minds of the men as to the proper way of performing the work, a poster showing the dangerous and improper way is usually sufficient. In other cases it is necessary to show both the unsafe and proper way of accomplishing the task, as otherwise the lesson intended to be taught is not grasped by many of the men. Slogan and statistical posters inject variety in this form of "food for thought" and their occasional use is helpful in breaking the monotony of the bulletin board. Posters dealing with general subjects or ones which have no direct application to the nature of the work where they are used have their rightful place and stimulate interest. Posters dealing with fire hazards, health and sanitation serve a useful purpose and their occasional use is doubtless valuable.

Home-made posters elicit greater interest, probably, than any other form. They possess the feature of novelty and, as they usually portray some hazardous condition at the operations where they originate, they are naturally of greater interest than the illustration of a dangerous condition existing at some plant in which the men are not directly interested.

Posters covering certain subjects, such as resuscitation from drowning or electric shock, may well be displayed permanently. They should be placed in locations where they are readily accessible and as a general practice should not be given room in a bulletin board.

Bulletin Board Maintenance

Bulletin boards must essentially be maintained attractive to insure maximum benefit of posters and the effectiveness of posters is greatly reduced if the bulletin board is not kept neat and well arranged. A fresh coat of paint occasionally is well worth its cost. The use of any large number of posters at one time is to be discouraged, as almost all men will not take sufficient time to read any of the posters if there is too much to digest. Two or three posters at a time will give the maximum value, as the workers will take time to study a few of them, but a larger number of posters, particularly if placed closely together, do not accomplish the desired result. The use of few posters and frequent changing of them is important.

* Paper presented before the Eighteenth Annual Safety Congress.

Keep your bulletin boards attractive and snappy and the men will become interested to the extent of making it a point to visit them regularly and frequently. If men go to the board and find displayed subject matter which they have seen shortly before their interest will diminish and they will lose the habit of consulting the board. The hazards of our industry are sufficiently large in number to permit us to vary frequently the type of poster shown. Avoid using too many posters on the same subject within a short period, as variety and newness attract more attention.

As all of you know, the National Safety News, issued by the Council each month, lists numerous posters, from which a supply may be selected. In addition to this source, the Council publishes each year a Poster Catalog wherein several hundred posters are illustrated.

Selection of Posters

I understand that many of the members of the National Safety Council leave to the Poster Division the selection of their posters. The representatives of the Council naturally do not have full knowledge of each industry and are not in as good position to choose those posters which may be most helpful as are those of you who are engaged in quarrying. If in the past you have not selected the posters which you desire to use in your safety program do so in the future and see whether better results are not secured through the use of posters all of which are applicable to conditions existing at your plants. I believe that the representatives of the Council much prefer that you make your own selection of posters.

Safety posters are used probably by all of us, yet how many of us give consideration to how they originate? The best results in the production of posters can be obtained if subject material for them is collected from various sources. Each one of those present here today has ideas which would be useful in producing posters. Give us the benefit of your thoughts along these lines and assist in supplying posters which will be of most value to us. Send us either a description of an outstanding hazard at your quarries or let us have a photograph or drawing of a dangerous practice or physical condition in order that the posters to be issued by our Section may be made to cover as broad a field as possible.

In photographing hazards it is important to bear in mind that the pose should be natural, as any departure from reality destroys, or at least greatly lessens, the value of the poster. If a person is shown performing some duty in an unsafe manner he should appear as unaware of the hazard involved as though it were not posed.

Development of Domestic Gypsum Industry

During the last decade the consumption of gypsum has increased rapidly in the United States, but the ability of American and Canadian mines to produce has increased even faster, points out R. M. Santmyers, mineral specialist, in a report recently issued by the United States Bureau of Mines, Department of Commerce. The industry has been active in research leading toward enlarging the field of its products and in educating architects, builders, and the general public with regard to the desirable features of gypsum materials. These efforts have been successful and promise to be even more so. Another stabilizing factor within the industry is the tendency of manufacturers to diversify their products. A manufacturer who has a complete line of specialties to fall back upon during an off season or a depression in the construction industry is better able to keep his plant well occupied throughout the year. During very recent years a number of new gypsum product specialties have been brought forth, many of which are closely identified with the individual manufacturer producing them—an excellent safeguard which appears to have a profitable future.

At the beginning of the last decade of the 19th century (1890), the total production of crude gypsum mined in the United States had reached the then exceptionally large figure of 182,995 short tons, valued at $574,523, or an average of $3.14 per ton. Since that year, the industry has shown a generally steady increase, with the exception of the war years, to a maximum in 1925. Even during 1917 and 1918 the decrease was not as great as in some other basic industries, due to the continued demand for fireproofing materials usable in rapid construction, as in factory and munitions buildings, cantonments, etc. It was during this period that the use of gypsum roofing slabs, precast or cast on the job, partition tiles, and plaster board came into prominence as building materials. Ease and rapidity of construction, relative cheapness of materials, and unusual fireproof qualities played the major part in increasing the demand for these products.

The sales of crude gypsum have been increasing proportionately with production of the crude rock. Because of the great increase in manufacture of portland cement that industry consumes larger quantities of crude gypsum as a retarder today than ever before, requiring 969,357 short tons of the total of 999,412 tons of crude gypsum used for all purposes in 1928. The use of ground crude gypsum as agricultural fertilizer or land plaster, however, has been showing a steady decrease during the past decade.

Review of Accident-Prevention Work in Non-Metallic Mineral Industry for 1929

By W. DEAN KEEFER
Director Industrial Safety Division, National Safety Council

IN GENERAL, there has been a growing interest in the non-metallic mineral industry in accident prevention work, and it is probable that statistics for the year will show an increasing number of companies and men engaged in continuous safety work.

It is remarkable that some of these companies have been able to maintain, month after month and even year after year, such a high degree of interest in their plant safety work and in their usual interplant safety contests. Formerly it was feared that a high pitch of interest in safety work "could not last." It was argued, after a company had been able to achieve a worthy safety record, that there would come a natural reaction, that overconfidence would develop, or that the men would become stale in a day-by-day safety program.

Of course there are examples of such reactions. But the long sustained records of some of these companies in the non-metallic industries—and especially in the coment industry—have effectually destroyed this former fear. The remarkable safety achievements in the cement industry, during the past five years, is a standing proof that a high degree of industrial safety is possible. It is a standing proof that industrial safety work, when properly organized and conducted, will not only justify itself from the humanitarian viewpoint but will yield substantial dividends in actual cash savings or increased plant efficiency.

The cement industry, due largely to consistent organized accident prevention work extending through a period of years, achieved the honor for 1928 as being the least hazardous of the 17 sections of the industrial safety division of the National Safety Council. But this condition did not always exist.

The change in attitude toward safety work in the cement industry is well illustrated from impromptu remarks by Henry A. Reninger, retiring president of the National Safety Council, before the Cement Section during the recent Annual Safety Congress.

"We started our own safety work in 1914 in the Lehigh organization," he stated. "In those early days, it was a hard job to sell the idea of safety to the cement people. It was a continuous struggle. Many presidents told me that it was just a lot of bunk, it was a theory, and if they put it into effect would interfere with their production. They said it was not practical, and they did not want it."

"But as I travel about the country today, attending the various national and regional meetings of the National Safety Council, it is a great pleasure to hear so many speakers, representing the industry, labor organizations, and the U. S. Government, stating to their audiences that if they want to know how to carry on safety in an industry they should study the cement industry. It has made the greatest progress on safety of any industrial group in the country."

Some of the reasons for such results were recently well stated by B. F. Affleck, president of the Universal Portland Cement Company of Chicago. "The prevention of accidents," he states, "has long been a policy of our company, both for humitarian and economic reasons. In addition to the moral value of conserving human life, industry today realizes that it also is good business to promote safety.

"The experience shows that it usually is less expensive to spend time and money to prevent accidents than it is to meet the cost of accidents after they have occurred. Some high-browed economist might call this a form of enlightened selfishness, but it really is only another example of the principle that human interests and business interests in the long run generally are identical.

"Reduction of nearly 94 per cent in lost-time accidents in all our plants, as compared with the record of ten years ago, has resulted from this emphasis on safety."

A review of the present safety practices in the non-metallic mineral industry requires, first, emphasis on the fact that old time principles of safety are achieving results. For example, H. H. Brewer, of the Alpha Portland Cement Co., said, at a session of the Annual Safety Congress, in describing the safety results of his company, "I believe we will have more screw conveyor accidents unless we keep hammering away at the employes in this department. I personally believe that no safety work does much good unless it is continued at short intervals. Men seem to feel that safety is something that should come from the management, and they exhibit a sort of grievance against giving their united efforts unless they are encouraged."

One of the important principles of safety work is an impartial investigation of all accidents, and the enforcement of safety rules.

One of the speakers at the 1929 Annual Safety Congress emphasized that his company had achieved substantial results through a system of

awards to its men for safety accomplishments. For instance, last year at Christmas time each employe was given a turkey, in appreciation of his efforts in establishing a record of one full year without a lost-time accident. Then, at the middle of the year, each man who had completed an additional six months without an accident was presented with a pocket knife. The speaker emphasized that these gifts appealed to the men, not so much for their value, but as something they could take home and show that their part in the safety work of the company was recognized and appreciated.

Likewise, a California cement plant employing from 270 to 300 men attributes its record of 12 months without a lost-time accident largely to the fact that a bonus of 1 per cent of their month's wages was offered to each group of employes who could complete a month without a single lost-time accident. These two examples illustrate the fact that safety work tends to become more and more personalized.

More and more companies are working out detailed safety codes which apply to their own plants, and then require that these safety codes be studied and followed by the men, through the leadership of the foremen and other officials.

Printed Matter Requested

Requests which have been coming to the National Safety Council prove that there is increasing general interest in all printed matter relating to accident prevention in the non-metallic mineral industries. This includes increasing demands for such publications of the National Safety Council as "Safety Organization for the Quarry Industry," "Planning an Industrial Safety Campaign," "Industrial Safety Organization," "Topics for Safety Meeting Conveyors," "Checking Plans and Specifications for Safety," "Construction of Machinery Guards," "Compressed Air Machinery and Equipment." There is also increased interest in such health practice pamphlets as "Industrial Eye Hazards," "Health Supervision in Industry," "Dust," "Infected Wounds," "Skin Affections."

To meet the increasing demand in this field of education, the engineering division of the American Society of Safety Engineers of the National Safety Council is preparing three additional industrial safety pamphlets for the cement industry. The first of these will be "Storing, Packing and Shipping Cement." The first paragraph in the tentative draft of this pamphlet illustrates the problems which will be considered:

"Although the sorting, packing and shipping departments of the average cement plant are not usually looked upon as hazardous places in comparison with the quarry, coal-grinding, and other departments, nevertheless they have been the scene of many accidents. Careful consideration of these departments will show that they have contributed many accidents, a number of which have resulted in death and permanent injury and, therefore, they are worthy of careful consideration from an accident prevention standpoint. In these departments, the screw conveyor and sliding materials have always been among the leading hazards."

The second pamphlet in this series will be entitled "Cement Rock Quarrying and Crushing."

"It is not our purpose," states the first part of the tentative draft of this pamphlet, "to deal with safety organization but rather to touch upon some of the hazards attending the operation of stone quarries and the crushing of stone. Safety practices are now generally taught and it is assumed that safe rules governing operations are impressed upon the minds of the workers and that, in especially hazardous cases, rules printed in several languages are posted in conspicuous places for their benefit.

"The first step of manufacturing processes involving the use of stone starts with the quarrying of stone, a department offering as many hazards as the succeeding processes or stages together. For this reason too much care cannot be taken as danger awaits us at every turn.

"Every operation of the quarry should be worked out carefully in detail and approached or started with a clear mind. In these days when labor is fairly plentiful and most men are willing to work, it is always best to employ men of age, since young men from 18 to 20 years old are not as likely to give the work the same careful thought as men several years their senior."

The third pamphlet in this industrial safety series will be on "Safety Practices in Cement Mill Shops."

American Standards Association

Additional important work in this field is being done by the American Standards Association, which launched a program in 1919 for the development of a number of national industrial safety codes which could be accepted as authoritative in their respective fields. The program for the completion of such a code includes, first, the appointment of a joint technical committee representing five interests—manufacturers of equipment in that particular field; employers or purchasers and users of such equipment; employes; governmental bodies having regulatory power or influence over the field in question and qualified individual or group specialists in that field; and insurance representatives.

The American Standards Association includes such member bodies as American Institute of Architects, American Institute of Electrical Engineers, American Institute of Mining and Metallurgical Engineers, American Mining Congress, American Society of Civil Engineers, American Society of Mechanical Engineers, National Association of

Mutual Casualty Company, National Safety Council, U. S. Department of Agriculture, and U. S. Department of Commerce.

Some of the safety codes already completed, of especial interest to the non-metallic mineral industries are "Safety Code for lighting factories, mills and other work places," "Safety Code for ladders," "Safety Code for elevators and escalators," "Safety Code for mechanical power transmission apparatus." Additional safety codes in course of preparation are: "Safety Code for construction work," "Safety Code for floor and wall openings, railings, etc.," "Safety Code for machine tools," "Safety Code for compressed air machinery," "Safety Code for conveyors and conveying machinery," "Safety Code for mechanical power control."

Still another important influence toward safety practices in the non-metallic mineral industry is the work of various state industrial accident commissions. Important work in this field has been done by the states of California, Nevada, New Jersey, New York, Utah, Washington, Wisconsin, and others.

As a notable example in this list, the Industrial Accident Commission of the State of California has prepared a little booklet on "Quarry Safety Rules" which is remarkably practical and complete. In the preface of this book it is explained that "The Commission has power, after a hearing and upon its own motion or upon complaint, by general or special orders, rules or regulations, or otherwise, 'to fix such reasonable standards and to prescribe, modify, and enforce such reasonable orders for the adoption, installation, use, maintenance and operation of safety devices, safeguards and other means or methods of protection, to be as nearly uniform as possible, as may be necessary to carry out all laws and lawful orders relative to the protection of the life and safety of employees in employment and places of employment.' "

They state in their definitions, that "the term quarry when used in these rules shall be held to mean a place from which stone, rock, sand, gravel or any other material is removed from open-face workings, but shall not include the removal of material in construction work."

These rules require that all the quarries operating in the state shall, not later than February 20 of each year, send a detailed report in writing on a form supplied by the Commission. If any additional conditions occur which tend "materially to increase hazards of quarry operations," then a supplementary report must be sent immediately.

There are detailed provisions for the care of all injured employees. It is provided that at least 5 per cent of all employees of quarries shall receive thorough first-aid training, including ability to administer artificial respiration by the Prone Pressure or Schafer method. At each quarry at least three men shall be trained in first aid as stated above. Such instruction in first aid must be given these employees at least once a month.

When a fatal injury occurs it is required that the Chief State Inspector or a Deputy shall make thorough investigations of the causes of the injury.

It is further required that "the superintendent of every quarry shall inspect, or have some competent person or persons appointed by him inspect all quarry appliances, boilers, engines, hoisting ropes, steam shovels, cranes, derricks, locomotives, cars, tracks, magazines, explosives, quarry working, ladders, and all parts and appliances of such quarry in actual use, and any such person or persons appointed by the said superintendent shall at once report any defects therein to the superintendent."

There are further provisions for general safety precautions, for inspections at the face of the quarry, and it is required that "safety bulletin boards shall be provided at all quarries. Miscellaneous rules for quarrymen, safety bulletins, pictures, slogans or circulars shall be posted on such bulletin boards."

There are further safety provisions for guard rails, air-pressure tanks, grinding wheels, engines and boilers, waste dump trucks, labor-camp sanitation, hoisting apparatus and derricks, ladders and ladderways, steam shovels, and locomotive trains.

Safety Committees

An appendix of the booklet includes "Suggestions and recommendations." As the first of these "The Industrial Accident Commission recommends that safety committees be organized at all quarries. The personnel of these committees shall be elected by the superintendent in charge of the quarry. It is suggested that such committees should be composed of at least two practical quarrymen, together with a foreman and assistant foreman or shift boss."

It is further stated that "the Industrial Accident Commission will cooperate with all quarry operators in the foundation of these committees and will supply any literature or posters which it has available with which to carry on the educational campaign." In addition, "it is recommended that the greatest care be taken that safety orders to employees be given in a language which the employee understands." There follows a section on "Miscellaneous Rules for Quarrymen." The first four of the 18 rules are as follows:

"1. You are forbidden to take wine, beer or other intoxicating liquor into the quarry or quarry plant.

"2. You are forbidden to take a short cut through dangerous workings.

"3. You must place drill steel or other material in a safety place so it can not fall or roll down on to men working below.

"4. Quarrymen must not deepen holes, or any parts of holes, left standing or abandoned, which have previously been charged with explosives."

Another section of the booklet includes "General Safety Requirements," based on general safety orders issued by the Industrial Accident Commission of the State of California. These include orders relating to gears, belts, pulleys, clutches, belts, shifters, shaftings, set screws, sprockets, flywheels, grinding wheels, ladders, stairways, platforms and runways, swing-doors and windows, keys and keyseats, floor openings, hoistways, and conveyors.

Side Feature During Recent Memphis Convention

In our preceding issue we described a special entertainment that was provided through the cooperation of W. W. Fischer, general manager of the Central Sand and Gravel Co., and representatives

Barbeque at plant of Central Sand and Gravel Co., Memphis, Tenn., Jan. 30, 1930

of the Allis-Chalmers Co., during the recent annual convention in Memphis of the National Sand and Gravel Association. The accompanying picture shows most of the visitors who were guests at Mr. Fischer's plant after they had finished their barbeque luncheon. Main interest in this excursion centered in the newly installed Newhouse B crusher which reduces oversize boulders to gravel size.

Resume of Activities of A. S. T. M. Committee C-11 on Gypsum for the Year 1929

By the Secretary, H. J. SCHWEIM, Development Engineer, U. S. Gypsum Co.

The Bureau of Mines New Brunswick Station is still very active in investigating the effect of different types of calcium sulfate as retarder for portland cement. During the past year the Bureau of Mines published Technical Paper No. 451 on this work entitled "Calcium Sulfate Retarder for Portland Cement Clinker," by Ernest E. Berger.

Dr. P. S. Roller of the Bureau of Mines has undertaken the problem from a fundamental point of view, in order to attempt an explanation of the differences in the action of the different forms $CaSo_4$ and to study the causes which affect them.

With a view of expediting the methods of testing gypsum and gypsum products, a Sectional Committee has been appointed to carefully review the present Standard Methods of Testing Gypsum and Gypsum Products (C 26-27) and requested to submit a report at the Spring meeting of the committee.

The present standard size of gypsum lath (Gypsum plasterboard) is 16 in. by 48 in., whereas the old size which has been standard for years was 32 in. by 36 in. On this latter size board, it was a simple matter to cut a specimen 12 in. in width and 18 in. in length and conduct tests with the board supported on bearings spaced 16 in. on centers, and with the load applied either parallel to the fiber of the paper or across the fiber of the paper. With a board 16 in. in width it is naturally impossible to cut an 18 in. width sample and test it on supports 16 in. on centers with the load running parallel to the grain of the paper—consequently, it is necessary to change the specifications covering the method of testing gypsum plasterboard.

A test has been conducted which seemed to indicate that there is an increase in strength of approximately 10 per cent of the strength of the board when the supports are spaced 14 in. on centers as compared with the present required spacing of 16 in.

The present method for determining normal consistency of calcined gypsum is by means of the Southard viscosimeter. This instrument, owing to the length of time required to determine normal consistency, is impractical and as a result has been discarded by the industry. It is necessary that some quick, accurate method for the determination of this property be standardized—therefore, tests were conducted by the Bureau of Standards to determine the merits of several different types of apparatus used for this purpose with the result that Committee C-11 has adopted the modified Vicat apparatus.

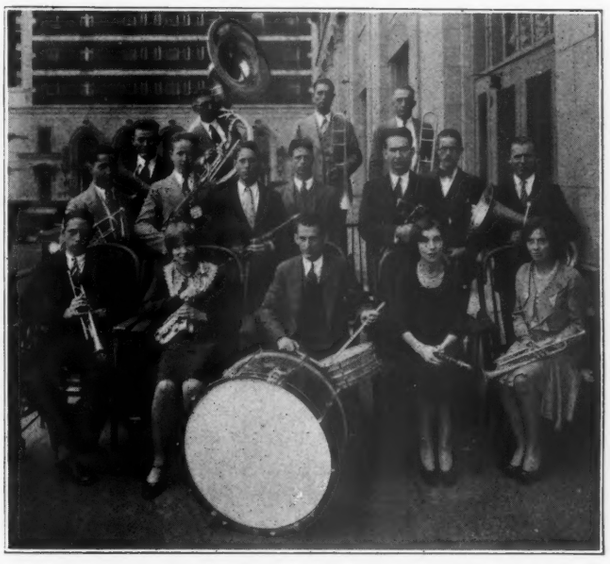
In all essentials except the plunger, the modified Vicat apparatus used is the same as the Vicat needle and rubber ring mold, used for determining the time of set of calcined gypsum. The plunger is made of aluminum tubing attached to a brass stem. The end that penetrates the mix is $\frac{3}{4}$ in. in diameter and $1\frac{3}{4}$ in. in length. The stem is $\frac{1}{4}$ in. in diameter and 6 in. in length. The total weight of the plunger is 50 grams. The plunger is allowed to drop vertically into the mix contained in a Vicat rubber ring mold. The penetration is determined by the drop of the plunger as read on a millimeter scale.

The Bureau of Standards is conducting tests to determine if it is not possible, by using different weights which may be screwed into the stem of the plunger, to determine normal consistency of sanded gypsum plaster and Keene's cement.

Cement Workers Discuss Accident Prevention Topics at Dallas, Tex., and Cincinnati, O.

REGIONAL safety meetings, brimful of enthusiasm, were held for cement mill workers at Dallas, Tex., February 4, and at Cincinnati, O., February 11. The meetings were among the fifteen scheduled for 1930 by the Portland Cement Association, which is continuing its drive for accident prevention in the cement industry again this year.

The Dallas meeting, held at the Baker Hotel, was marked by a larger attendance than had previously been recorded at safety meetings in past years in the Lone Star state. Seven of the nine mills in Texas were represented, the other two finding it impossible because of the long distance and special work being undertaken at the present time in their mills to send representatives. Lewis R. Ferguson, vice-president of the Lone Star Cement Company of Texas, called the morning session to order and called on A. J. R. Curtis of the Association for a report on safety work in the industry. Mr. Curtis pointed out that, in 1925, Texas cement mills suffered 117 lost-time accidents, while only 23 were recorded during the twelve months of 1929. He praised particularly the record of the Trinity Portland Cement Company, which won two safety trophies in 1929, the Dallas and Houston plants having gone through the year without accident.



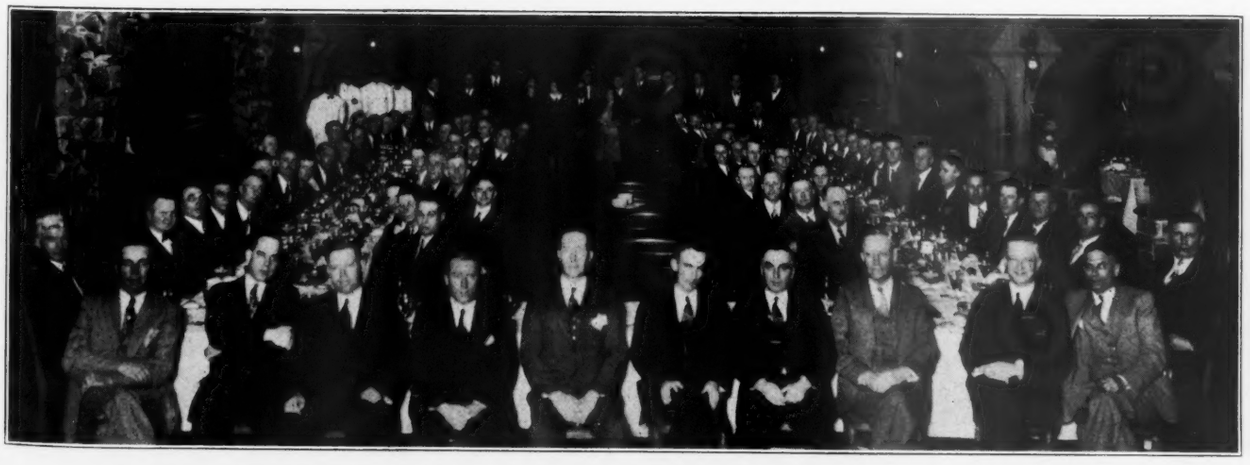
Hot Clinker Band, Dallas plant, Lone Star Cement Co.

Housekeeping and Safety

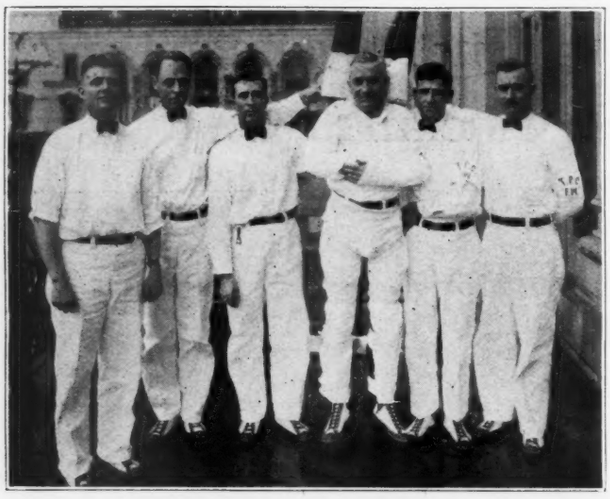
"Good Housekeeping as an Aid to Safety" was the subject of a talk by C. J. Lofstedt, superintendent of the Houston plant of the Lone Star Cement Company Texas. This address proved so interesting and instructive that it was read a week later by R. J. Elledge, superintendent of the Greencastle, Ind., plant of the Lone Star Cement Company Indiana at the Cincinnati meeting and was, in part, as follows:

"Housekeeping, according to our dictionary, means the management of a number of persons dwelling under one roof. Would not that meaning apply to our plant as well as our home? Should we not try to make an addition to that picture? It is so deeply carved that perhaps it would be hard to change, but certainly we could make a small addition. Henceforth, when we hear that word 'housekeeping,' let us add, way down in the right-hand corner, near the frame, a bag of cement.

"The housekeeper of our home we always think of as our wife or our mother. Who is the housekeeper at our other home? We are, you and I, with our department, our mill, kiln, work bench,



Dinner, Feb. 4, 1930, at Baker Hotel, Dallas regional meeting, Portland Cement Association



Fort Worth first-aid team, Trinity Portland Cement Co.: H. Fleming, captain, G. A. Perry, R. E. Deilman, R. E. Galbraith, A. E. Morris, and L. W. Winders

or what not as the scene of our housekeeping. Do we want the conditions at the plant to be the same as at home? Do we want our families at home exposed to the same dangers as we are at the plant; or, are we going to be the same good housekeepers as our wives and mothers? Did your mother expose you to bodily injury or bodily ills by her methods of housekeeping, or did housekeeping and safety go hand in hand?

"Let each one of us imagine for a while that our name is Bill Jones and I will tell a little story that goes something like this: I, Bill Jones, am an employee of So and So Cement Company, which has a slogan for its employees, 'Anything Goes, Only Make Cement.' I consider my job a good one and on the strength of an expected or unexpected increase in pay I decide to move my family to a new house. I choose a prospective place, locate the owner and have him as a guide for my inspection. As he points out the features of this house I am impressed with the close resemblance to my home at the plant and recall certain incidences.

"Showing me the cellar, the landlord remarked that it only leaked when it rained, that the heater was cracked, but otherwise everything was O. K. Of course, at the plant the drainage isn't so good, but there are plenty of boards on which to stand and when sprinkled with sand are absolutely nonskid. Yes, we generally have two or three colds during the winter, but last winter I only lost three weeks.

"I inspected the kitchen next and noted the gas stove did not have a drip pan under the burners, and the grease had formed some of the most beautiful designs on the linoleum that you ever saw. It is too bad those bearing foundations at the plant are so black with oil or maybe we could see some designs there. I don't know what kind of a design I stepped on the other day, but I sure did wrench my back! I do not want a hood over the stove to carry away the gases and odors. It would just be something else to go wrong. We don't have such things at the plant, although the air is pretty thick at times, but we just cut our breathing in half when its gets too heavy. I heard that a cement plant out West installed dust collectors as a safeguard for their workmen's health—they should get some *real* men to work there, as we have at our plant.

"The rest of the downstairs rooms were just to my liking, the lights were very handy, just a string hanging down from the ceiling, and all you had to do was pull the string. A couple of them sparked a little when I tried them, but the kids will like that—they are just crazy about fireworks! I don't imagine it would take long before you could find the string in the dark without falling over a thing. Of course, the kids while looking for the string will have to watch out for twenty penny nails supporting calendars on the wall. Those nails, by the way, will make a fine place to hang your hat and coat. If they intend to work over at the plant when they grow up, it will be good experience for them. We old-timers can find our way around that plant with our eyes closed—still, in some places it would be useless to open them. There was a new fellow working there who did not know there was a belt drive in one of those dark places—we took up a collection for his widow.

"In walking through the rooms, the owner tripped over a loose board, and right then and there I could see where my experience at the plant was worth something. We get fine training in stepping over obstacles. I tried to impress our training upon him by describing our quarry, the floor littered with stones, with the boys nimbly hopping from one to another in hurrying away from rolling stones and blasts. I was told, while going up the stairs, that the part of the railing that was missing would be replaced. I assured him it was not necessary. Ladders are better than stairs anyway, and they don't require a railing.

"The roof was in fine condition, only a few loose slates. Just like at the plant, there are some loose roofing sheets that I thought would blow off three years ago, but they are still there. Well, to make it short, I moved and nothing has happened, yet. Does that description apply to your home or to your plant? Is that where you would want your family to live? Is that where your family would want you to work?"

H. K. Cameron, of E. I. du Pont de Nemours, Inc., talked on "Quarry Practice." He based his message on the 49 "Don'ts" in the use of explosives in quarries and presented the subject in a forceful manner.

Luncheon was served at 12:30 o'clock with C. E. Ulrickson, vice-president of the Trinity Portland Cement Company, serving as chairman. Music

was supplied by the Hot Clinker orchestra of the Lone Star Dallas plant.

The session was resumed in the afternoon with R. O. Bartholomew, chief engineer of the Trinity Portland Cement Company, presiding. A. E. Morris, warehouse foreman of the Fort Worth plant of the Trinity company, gave a short talk on the subject, "Hazards in the Packing House." "Increasing Efficiency in the Plant Safety Program" was the topic of another talk by Dr. C. E. Seale, physician at the Dallas plant of the Lone Star company. Thomas E. Gibson, manager of the Lumbermen's Reciprocal Association of Dallas, was a guest speaker and has as his subject, "The Accident Report." These interesting remarks were followed by a first-aid team demonstration, conducted by Alex U. Miller of the U. S. Bureau of Mines, and participated in by the Dallas and Fort Worth plants of the Trinity Portland Cement Company.

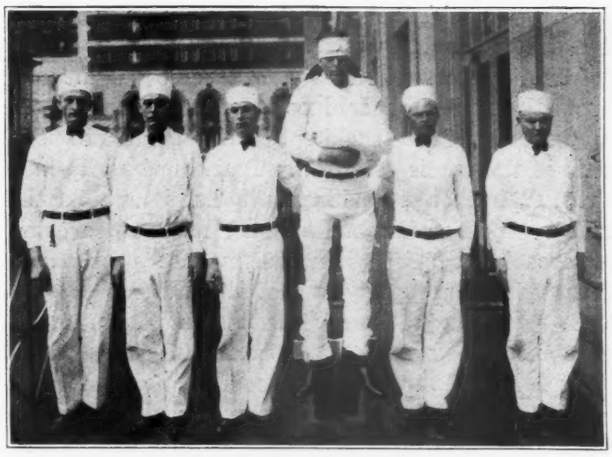
Mr. Ferguson, chairman at the morning session, also acted as toastmaster at the safety dinner and rally in the evening. Earle P. Adams, chairman of the Texas Industrial Accident Board, of Austin, Tex., was the speaker. A playlet, "The Ace and the Cheat," was staged by courtesy of the Dallas Power and Light Company, and group singing was a feature after the dinner.

Cincinnati Meeting

An attendance of 68 greeted W. W. Hamilton, general chairman, at the Cincinnati meeting. Mr. Hamilton, safety director of the Alpha Portland Cement Company of Easton, Pa., called the meeting to order on the roof garden of the Hotel Gibson. The morning session was featured by a talk on "The Plant Doctor's Part in Accident Prevention," by Dr. George Hunter of the Ironton, O., plant of the Alpha Portland Cement Company. Dr. Hunter laid stress on the fact that little injuries often turn out quite seriously if neglected, and urged prompt attention to the small mishaps that are a daily occurrence around the quarry and plant.

Luncheon was served at 12:15 o'clock in the roof garden foyer of the hotel, with Hon. Thomas M. Gregory of the Ohio Industrial Commission making an address.

When the meeting was resumed in the afternoon, with W. H. Weitknecht, superintendent of the Lehigh Portland Cement Company, as chairman, the delegates were warmly greeted by Mayor Russel Wilson of Cincinnati. After a short program of talks, a paper on "Storing, Packing and Shipping of Cement" was presented. Accident hazards in these operations were discussed at great length and some of the valuable suggestions brought out are presented here for the benefit of cement workers who were unable to attend the meetings:



Dallas first-aid team, Trinity Portland Cement Co.: T. C. Pulley, captain, N. Duncan, J. Duncan, Frank Owens, L. O. Talkington, and Samuel Taylor

Safe Practices Urged

The greatest danger in the operation of spiral screw conveyors is that of workmen getting their hands or feet caught in the conveyor. When the conveyors become clogged, workmen sometimes endeavor to dislodge the material without first shutting off the power. In so doing, they take a chance of having their hands or feet caught in the conveyor, and other employees, not knowing the conveyor lids have been removed and in order to release the clogged condition, step into the conveyor, resulting in serious injury. Under no conditions should an attempt be made to loosen material in a screw conveyor trough or to make repairs without first shutting off the power and locking the motor switches, as well as hanging on the starting switch a danger tag reading, "Man Working on Conveyor."

In the older-type cement plants, cement is stored in bins and open-type stock houses, with walk-ways running along the side of the bins. Often the cement is allowed to pile up in the bin until it runs over on the walk-way. Employees inspecting the bins have been killed due to being thrown into the cement and smothered as a result of the walk-way collapsing. Walk-ways should be so designed and located that the cement cannot pile on them.

A large number of accidents in the packing room and stock houses are caused by cement spurting into the face and eyes of the packing machine operators, due to a bag bursting, or a small hole in it. This type of hazard can be eliminated, partly by the proper location of the seat on which the machine operator sits, and entirely, by compelling operators to wear goggles. There has been considerable discussion and difference of opinion as to the ability of the packing machine operator to wear goggles advantageously. Claims have been advanced that, during the hot weather, the combination of perspiration and a small amount of cement dust makes the goggles ineffective. However, the fact that the goggles are being worn successfully

by many packing machine operators proves that the scheme is entirely feasible.

Whether cement in bags is discharged directly from the packing machines into the car, or onto a conveyor belt, the trucking of the cement into position in the car is essential. Trucking has its hazards, such as men striking their hands against the side or ends of the car, slipping on the floor, and an occasional upset when passing over poorly constructed or improperly anchored runways.

In preparing sacks for the packing department, care should be exercised to examine the sacks carefully as to the strength of the fabric and the elimination of small holes, so as to prevent sacks bursting at the packing machines, causing burns due to hot cement and eye injuries. In storing sacks that have been cleaned, care should be taken that the piles are erected in a self-supporting manner, cross-stacked and tied so that when a part of the sacks are removed, the pile will not fall on the workmen removing other sacks. The piles should be arranged with gangways between them, and, if over 10 feet high, drawn in as they go up.

Senate Refuses Protective Tariff on Cement and Gypsum

Proposals to levy tariffs on portland cement and gypsum have been defeated in the United States senate, the commodities having been voted back on the free list after a bitter fight to protect American industry from European importation.

Cement was restored to a duty-free status in the upper house on Jan. 31 by a vote of 40 to 35, the house of representatives having previously passed a bill recommending a tariff of eight cents per hundredweight. On Feb. 1, the senate defeated the proposal to levy a tariff of 75 cents a ton on crude gypsum, leaving it on the free list where it has been since 1922. The senate also eliminated a previously approved increase in duty on calcined and ground gypsum, approving, by a vote of 47 to 17, a motion by Senator Walsh of Massachusetts to retain the present levy of $1.40 a ton. A tariff of $3 had been proposed.

The defeat of the cement tariff measure is felt as a blow by producers along the Atlantic seaboard. A government investigation recently conducted showed that 48 per cent of the cement mills in that region were operating at a loss, while nearly a dozen plants had been forced to discontinue operations during the last year because of the menace of foreign competition. Manufacturers based their plea for tariff protection on the claim that American standards of living and wages for workmen could not compete with those in Belgium, where most of the imported cement reaching this country is produced.

When the proposal to levy a duty on cement came up before the Senate, 15 Republicans, 24 Democrats and one Farmer-Laborite voted to restore cement to the free list, while 29 Republicans and 6 Democrats voted to place a tariff on importations of 8 cents per 100 lb. The defeat was turned by a coalition of Democrats and radical Republicans from the Middle West where, leaders in the cement industry had contended, no effect on prices would result. The measure had been proposed merely as a protection to manufacturers along the Atlantic coast, they declared.

Senator W. H. McMaster, of South Dakota, led the attack on the duty on cement. Senator G. P. Nye, of North Dakota, presented information from income-tax reports, as furnished to the finance committee by the treasury, purporting to show large profits by leading cement companies. Senator Guy Goff, of West Virginia, countered with data as furnished by the cement industry. Senator Royal S. Copeland, of New York, asserted that the cement companies on the eastern seaboard were in dire need of tariff protection.

Senator McMaster offered his amendment at the very beginning of the fight and a lengthy debate ensued. He held the floor for about two hours and attacked the duty proposed by the finance committee in vigorous fashion, picturing it as an imposition on farmers as well as on the public generally and calculating that a duty of eight cents per hundred pounds would cost the consumers of the United States $100,000 a year.

"The general situation of the cement industry does not justify such a tariff," he said. "Under free trade conditions, this industry has enjoyed prosperity."

"The cold facts are," he added, "that the imports of cement in 1922 were equivalent to only about ¼ per cent of the total production in the United States."

He said foreign cement could not be moved far into the interior of the country because the railroads had made their rates purposely to prevent "transportation by rail of imported cement" for even short distances.

"The principal cities in the north which are subject to foreign competition are Philadelphia, New York and Boston," he declared.

Senator Copeland took issue with Senator McMaster. He spoke in behalf of the finance committee rate and especially stressed the condition of the factories in New York state. He held that free cement would contribute to unemployment.

Senator Alben W. Barkley, Democrat, of Kentucky, joined in the discussion and took the position that the proposed duty was not justified.

Non-staining portland cement was not carried to the free list. It is left dutiable under the bill at eight cents for one hundred pounds. This matter was not in controversy, as it is already subject to duty.

Sand and Gravel Plant in Southwestern New York Obtains Gravel From Several Pits

This Makes Possible the Production of Material In Sizes to Meet Any Requirements

THE plant of the Alfred-Atlas Gravel and Sand Corp. at Alfred, N. Y. is one of the many that have been built in recent years to supply the demand for aggregate created by state road-building programs. The plant went into operation in June 1928 although the company was formed several years previously for the production of bank-run gravel.

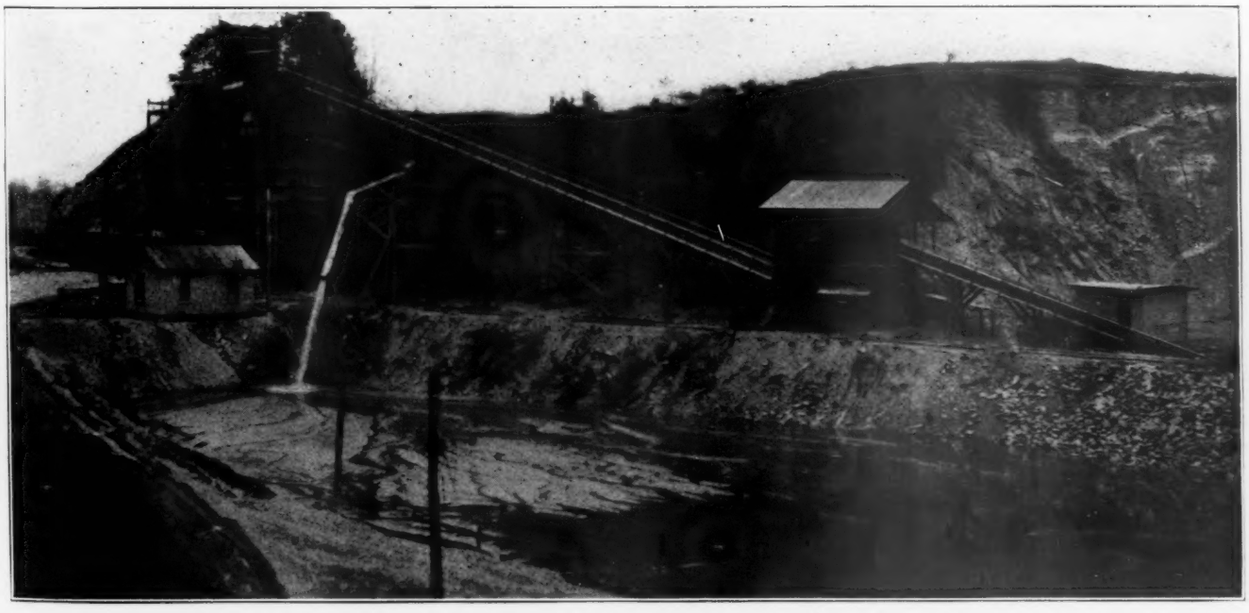
The company owns five pits on a total property of about 180 acres but only three of these are being operated at present. One of the pits is at the plant while the others are on a large tract of land about ¾ mi. from the plant. The land is extremely hilly, one of the hills of gravel now being worked on the large tract being more than 320 ft. higher than the concrete state highway which connects it to the plant. All hauling from the pits is done by trucks.

The pit at the plant has a good grade of gravel of medium size with about 35 per cent sand. This was originally excavated by a gasoline shovel which loaded into trucks to the plant but in July of this year a 2-yd. Beaumont drag scraper was installed. This method has proved to be more satisfactory and less expensive for the short haul necessary here. The 2-cu. yd. bucket operates on a 300-ft. span at present and discharges the material directly into the plant hopper. It is operated by a 2-drum Beaumont hoist which is driven through a silent chain drive by a 75-hp. General Electric motor. This pit is operated when a regular run of gravel is required because of the gradation of the material and the economy with which it can be excavated.

Shovel loading trucks which haul gravel to plant

When a finer or coarser run of material is needed it is brought in from the two pits further from the plant. The stone pit, so called because of the coarseness of the deposit, was at one time a sand pit but has worked into a coarse gravel with a content of about 40 per cent sand. This is loaded by an Erie ⅝-cu. yd. steam shovel into trucks and hauled to the plant over the concrete highway.

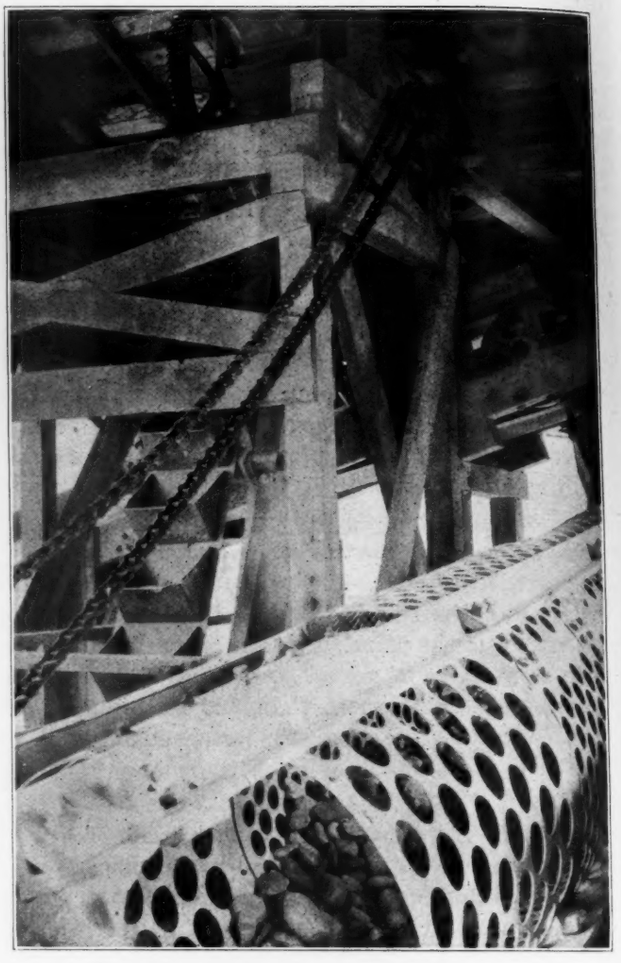
The sand pit is near the stone pit but is about 300 ft. higher. It has been worked for over 20



Plant from Southeast with settling pond in foreground and one of gravel pits at right

Loading pit-run sand into truck to be hauled to plant

years. To reach it the trucks must leave the concrete highway and follow a winding road up a hill which is so steep that they are just able to climb it when empty. The sand is of medium gradation and so uniformly clean that it is used for masonry work without requiring washing. It is loaded from the bank into trucks by a Barber-Greene No. 42 gasoline-driven stockpile loader. A stationary screen can be attached to the loader to separate out occasional pieces of gravel from a deposit above the sand. This loader has been in operation for 8 years and continues to give satisfactory service. The sand is hauled to a bank alongside the railroad siding at the plant and dumped directly into railroad cars for shipment.



Scalping screen, conveyor and elevator

The scraper or the trucks, as the case may be, dump directly into a concrete hopper at the plant over which is a rail grizzly with 5-in. spacing. A Telsmith 20-in. by 5-ft. plate feeder delivers the material onto a 20-in. inclined belt conveyor on 85-ft. centers which discharges into the scalping screen. This is a 32-in. by 12-ft. Telsmith revolving screen which ordinarily uses 1½-in. perforations. A set of sections with 2¾-in. perforations is kept on hand at all times to meet with any variations in the material or the market demand.

The oversize from the screen drops through a

Truck discharging gravel into plant hopper, hoist house and conveyor to scalping screen at left

Plate feeder discharging material from plant hopper onto plant conveyor

chute to the Telsmith 8A gyratory primary crusher. This discharges to a belt bucket elevator on 28-ft. centers which feeds the crushed stone back onto the conveyor to the scalping screen. The crusher

Sizing screen and conveyor from scalping screen.

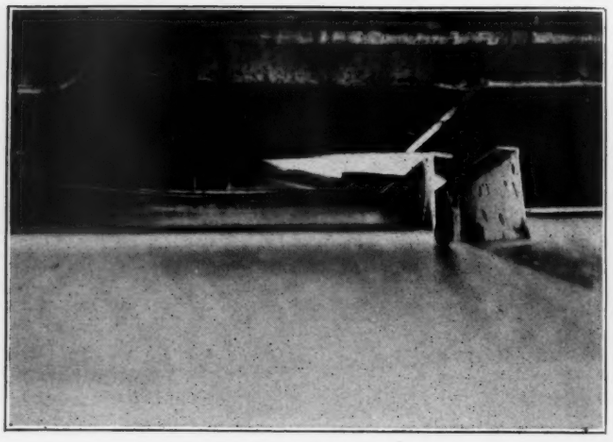
Drag scraper at right which excavates material from pit near plant

is belt driven by a Crocker-Wheeler 50-hp. motor which also drives the elevator, the scalping screen and the conveyor. The plate feeder is chain-driven from the conveyor tail pulley.

The material passing through the scalping screen drops onto a 20-in. belt conveyor on 178-ft. centers which carries the material to the top of the screening building. The conveyor discharges into the Telsmith Ajax 40-in. by 16-ft. 6-in. washing screen which has an outer sand jacket. Hinged rollers keep this jacket from clogging. The main conveyor is gear-driven by a 25-hp. and the screen by a 15-hp. Crocker-Wheeler motor. Three sizes of gravel are obtained, 1½-in. to 2¾-in., 1 1/16-in. to 1½-in., and 3/16-in. to 1 1/16-in. These go through chutes directly into the bins.

The oversize, over 2¾-in., goes through a chute to a wastepile alongside the plant. Occasionally, however, an exceptionally coarse stone is required

Loading gravel from bins to cars, note perforated plate and jet of water giving final rinse



Flow of water over top of sand settling tanks

Plant from southwest with office at right

and then some of the oversize is chuted in with the 1½-in. to 2¾-in. material. The material passing through the outer jacket goes to two No. 7 Telsmith sand-settling tanks through a split chute. The coarse sand is deposited here while the fine sand is carried away by the overflow of waste water. The sand from the settling tanks discharges into two Telsmith screw dewaterers which in turn discharge into bins. The screws are both driven from the same 5-hp. motor.

The five bins have a total capacity of 550 tons, two of them being used for sand and the others for stone. Each bin has a chute at the side for loading to cars and a chute underneath for loading to trucks. All of the gates are of the quadrant type. Each chute is perforated with holes of various sizes depending on the size of material handled and a spray of water directed on the gravel as it slides down the chute removes any small particles which may have accumulated.

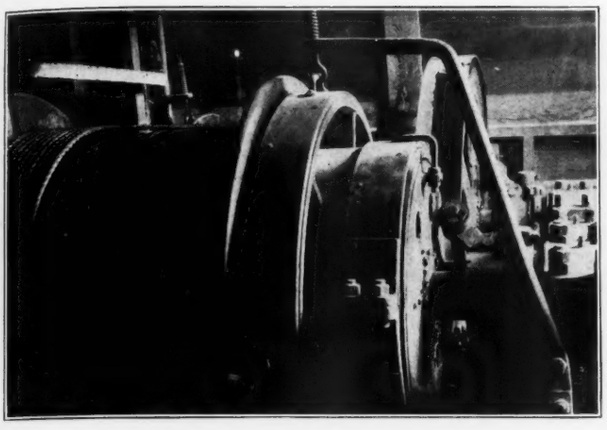
The main line of the Erie railroad between New York and Chicago runs by the plant with which it is connected by a side track. This has a capacity of 15 cars and a grade sufficiently steep to eliminate the necessity of having a car puller. Shipments are made within a radius of about 50 miles mostly by rail for roads and concrete highways.

Water for washing the gravel and sand is obtained from a creek flowing near the plant. The waste water goes to a sump and after filtering through the gravel goes through a culvert under the state highway into the creek. A dam there keeps the water at a minimum depth of 4 ft. so that the pump can operate efficiently. The Moore 750 g.p.m. capacity centrifugal pump takes the water through an 8-in. intake line through the same culvert and pumps it through an 8-in. line to the plant. The pump is direct-driven by a 25-hp. Crocker-Wheeler motor and Crane valves and fittings are used throughout.

The plant was designed by the Smith Engineering Works and uses mostly Telsmith equipment. With a few exceptions, Crocker-Wheeler slip-ring induction motors are used throughout. Goodyear conveyor belting and Leschen Red Strand cables are used exclusively. All foundations are of con-

Discharge of sand settling tank feeding to screw dewaterer

Loading sand from trucks direct to cars

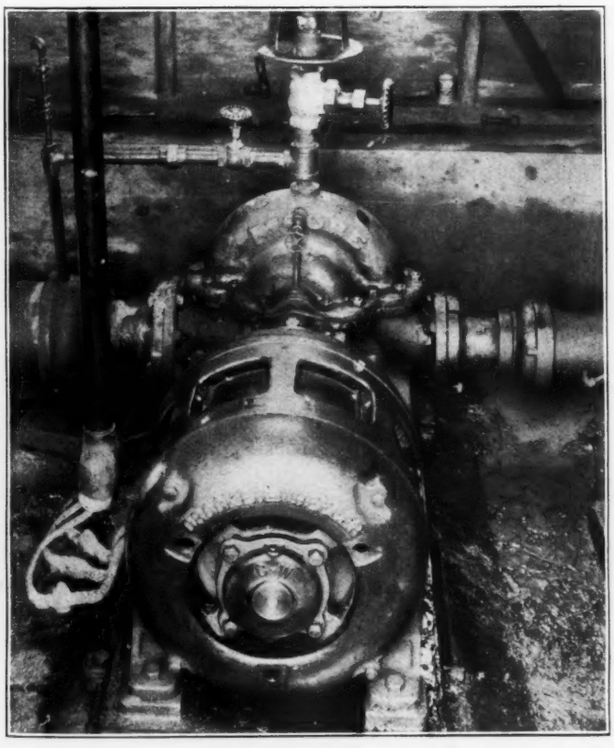


Hoist operating drag scraper

crete and all buildings and framework are of timber except the plant frame which is structural steel.

The plant has a capacity of over 600 tons in a normal working day but has been working overtime most of the time since it went into operation, sometimes producing double this amount in one day. No stockpiling is being done at present as there is no adequate space for a stockpile. A space is being cleared for this purpose and a crane will then be purchased for rehandling the material.

John J. Merrill is president of the company, J. T. Foody is vice-president, Ray Wingate is secretary and engineer, and D. S. Burdick is treasurer. They maintain an office in the town of Alfred and Leonard Claire, superintendent, maintains his office at the plant.



Centrifugal pump furnishing washing water to plant

Alaskan Information

Since the building of the Alaska Railroad from Seward to Fairbanks has made the interior of the Territory more accessible, public interest in information relating to Alaska has much increased, and the demand for Government publications on that subject has accordingly been greater. In order to furnish in compact form the more salient facts regarding the Territory, the Interior Department, with the cooperation of several governmental bureaus that are working in Alaska, has issued a pamphlet entitled "General Information Regarding the Territory of Alaska," which is distributed free by the Office of the Secretary of the Interior.

The Interior Department, through the Geological Survey, has also for 30 years been making investigations in Alaska and has published several hundred reports containing detailed information not only on the geology and mineral deposits but on general geographic features of the country. Each year the Geological Survey prepares a summary statement regarding the production of minerals and the mining developments of the preceding year in the Territory. All these reports are distributed free, or, upon exhaustion of free editions, are sold by the Superintendent of Documents, Government Printing Office. Requests for free copies may be addressed to the U. S. Geological Survey, Washington, D. C.

Practically all the other governmental bureaus that are working in Alaska issue from time to time reports that are of great value to prospective settlers or others who wish authoritative information about the Territory. In the Interior Department the General Land Office, the National Park Service, and the Office of Education have issued reports or collected information relating to certain Alaskan matters. Among the many other governmental organizations issuing reports on Alaska may be mentioned the Department of Agriculture, especially the Forest Service, Biological Survey, Bureau of Public Roads, and Weather Bureau; and the Department of Commerce, through the Bureau of Mines, Bureau of the Census, Bureau of Fisheries, and Coast and Geodetic Survey. The address of all these bureaus is Washington, D. C., and inquiries relating to matters within their particular fields should be addressed to them direct. A valuable nongovernmental work which gives references to practically all important publications on Alaska, is "A bibliography of Alaskan literature, 1724-1924," by Judge James Wickersham, published by the Alaska Agricultural College and School of Mines, Fairbanks, 1928, which lists more than 10,000 separate articles.

Type of Car Bottom Is Major Factor in the Cost of Cleaning and Repairing*

Committee Anticipates Relief from this Burden and Makes Recommendations for Its Accomplishment

By J. C. BUCKBEE, Chairman

AT our annual meeting in Detroit in January, 1928, our president, R. C. Fletcher, appointed a committee to investigate the cost of cleaning and repairing railroad cars used for the shipping of sand and gravel, with a view to seeking the help of the American Railway Association and the railroads in improving conditions in order that our industry might be relieved of the very heavy burden from which a preliminary investigation had shown we were suffering. As Chairman of that committee, I beg to report the progress that has been made to date.

Your committee felt that it should be able to present data covering the experience of the crushed stone industry and the slag industry as well as the sand and gravel industry, since all three industries use the same type of cars. We accordingly enlisted the support of the National Crushed Stone Association and the National Slag Association and have worked jointly with them in all of our endeavors.

Our first step was to send out a questionnaire to all members of these associations and all other substantial producers in each of the industries who did not belong to the association of their industry. This questionnaire asked for certain specific data as to the cost of cleaning and repairing the cars given them by the railroads for loading and additional data as to the percentage of their shipments that was unloaded by clamshell buckets and the percentage of their shipments that was demanded in battleship cars or drop-bottom cars.

The response to the questionnaire was prompt and gratifying, 89 companies in our industry producing 450,000 cars of sand and gravel annually sent in complete returns. From the crushed stone industry, we obtained the experience of 77 plants producing approximately 300,000 cars annually, and from the National Slag Association we obtained the experience of six plants shipping approximately 100,000 cars annually; so we had the experience of a total of 172 producers shipping in all close to a million cars annually, and I am sure you will be gratified to know that when we came to presenting our data to the American Railway Association we were told that this was the first really complete survey of the subject that has ever been presented to them and we were complimented upon the manner in which the data had been compiled and the clear picture of the situation presented.

Survey Discloses Cost to Industries

Our survey showed that the average cost of cleaning and repairing a car in the sand and gravel industry was 46.5 cents; that the average cost in the crushed stone industry was 26.7 cents; and that the average cost in the slag industry was 38.4 cents. As there were approximately 2,500,000 cars of sand and gravel, crushed stone and slag shipped in 1928, our survey proved that the cleaning and repairing of these cars cost the above industries well over $1,000,000.

As was to be expected, the cost of cleaning and repairing cars in our industry was greater for the smaller producer than for the larger producer. For producers shipping 2,000 cars or less annually, our survey showed the cost to be 91 cents per car. This figure gradually became less as the shipments became larger, and for producers shipping over 20,000 cars annually the average cost was 27.7 cents per car. As stated above, the average cost for the entire industry was 46.5 cents per car, and this figure, as was to be expected, represents the cost to producers shipping from 5,000 to 10,000 cars annually; so with the above figures in mind you may well calculate what the burden probably amounts to at your own plant.

For the purpose of guiding the railroads in their purchase of equipment for serving our industry as well as the crushed stone and slag industries, we asked for data in our questionnaire, as stated above, as to the percentage of shipments that was unloaded with clamshell buckets, the percentage that was demanded in battleship cars and the percentage that was demanded in drop-bottom cars, and our survey brought forth facts that, so far as we know, were never available before.

Types of Cars Required

Our survey showed that approximately 50 per cent of all the sand and gravel shipped was unloaded with clamshell buckets and that but 13 per cent of the sand and gravel shipped was demanded in drop-bottom cars. The data collected by the National Crushed Stone Association showed that but 25 per cent of its tonnage was demanded in drop-bottom cars, while the survey of the National Slag Associa-

* Presented at Memphis convention of National Sand and Gravel Association.

tion showed that less than 1 per cent of its shipments was demanded in drop-bottom cars.

It was quite definitely established by the above data that the drop-bottom type of cars was not as extensively needed in the industries mentioned as other types of equipment and that the carriers therefore need add but few of such type cars in the future for the use of these industries. It also led to the suggestion that the older and weaker types of drop-bottom cars now in service might, with good results to both the carriers and the shippers, be converted to solid bottoms when next in the repair shops, as the heavy solid bottoms resist the impact of the clamshell buckets much better than do the drop-bottoms.

The survey further showed that where trestles are provided for unloading or where hoppers are below the track, the hopper type of car is more desirable, as such cars are, in practically all instances, nearly 100 per cent self-cleaning, while the drop-bottom car is rarely if ever self-cleaning.

It was quite interesting to note that in the case of the slag industry 99 per cent of its shipments was demanded in battleships or hopper bottom cars, while in our own industry numerous shippers reported a demand for 50 per cent or more of their shipments in hopper bottoms and several substantial shippers reported a demand of from 80 per cent to 100 per cent of their shipments in hopper bottom cars.

Company Car Types

As was to be expected, our survey showed that the drop-bottom type of car was the most expensive to clean and repair, which, coupled with the above facts as to the demands of the trade, proved conclusively that the carriers, for their own good as well as the shippers' and consignees' good, should add solid bottom cars and battleships or hopper type cars to their equipment in the future rather than the drop-bottom type.

Our thought was that the question of cleaning and repairing railroad cars to receive our shipments was a mutual problem of the railroads and the shippers, and we approached the entire problem with the idea of getting the necessary data and cooperating with the railroads in minimizing the burden. I am happy to report that when we appeared before the American Railway Association in Washington last June, together with representatives of the crushed stone and slag industries, we were greeted most cordially and assured the hearty cooperation of the American Railway Association and the railroads.

Presenting Report

Our formal report to the American Railway Association was presented in written form on August 9, 1929, by a joint committee of the National Sand and Gravel Association, the National Slag Association and the National Crushed Stone Association, the writer signing the report on behalf of the National Sand and Gravel Association, L. E. McDermut signing on behalf of the National Slag Association and F. T. Gucker on behalf of the National Crushed Stone Association. This report presented our data and recommendations in detail and the American Railway Association has sent copies of the report to its regional boards for their consideration and recommendations, so the matter has been formally presented to the railroads and is now under consideration by them.

The necessity of cleaning cars placed at our plants for loading arises from the negligence of the last consignee in failing to remove the contents of the car he received. Obviously his carelessness should not impose a burden either on the carrier or the shipper who next receives the car for loading. The railroad company, in the first instance, delivered a clean car to the first shipper, as the car was new. The first consignee and all that followed him should, in justice to the railroad company as well as in justice to the next shipper, return the car in clean condition ready for the next loading.

Consignee Should Clean Cars

So far as we know there is no order of the Interstate Commerce Commission which stipulates that the consignee must clean the car thoroughly before returning the car to the carrier. We feel that such an order should be issued and have so recommended to the American Railway Association. We further feel that where the provisions of the order are neglected the carrier should be empowered to refuse to accept the return of the car and should be further empowered to apply demurrage charges until the consignee cleans the car, and we have recommended to the American Railway Association that the Interstate Commerce Commission be asked to issue an order so empowering the railroads.

Undoubtedly the railroads are anxious to supply the shippers with the kind of equipment best suited to the demands of the trade, and we have therefore pointed out to the American Railway Association the demands of the trade for the various types of cars as shown by our survey.

While it is undoubtedly the duty of the carrier to furnish the shipper with a car that will transport the commodity safely to its destination, we appreciate that at the peak of the season when the shippers have a great demand for cars the railroads cannot always furnish cars that are in perfect condition. We feel, however, that greater care can be exercised by the railroads in putting their cars through the repair shops and that a great improvement can be made in the condition of the cars given our industry for loading with a consequent saving both to the shipper and to the railroad.

We believe that a cooperative program should be

(*Continued on page* 66)

Committee Reports Usual Procedures in Securing Adoption of Trade Practice Rules*

By HUGH HADDOW, JR., Chairman

AT A MEETING of the Board of Directors of the National Sand and Gravel Association, held in Toronto, Ontario, on May 30, consideration was given to the advisability of holding a trade practice conference of the sand and gravel industry. Preliminary reports on the subject were presented to the Board by the executive staff of the Association and an opportunity was had to weigh the advantages which such a conference would have to our industry. It was then agreed that a Committee on Trade Relations should be appointed for the purpose of making further and more complete investigations, and to submit a report at the annual convention of the Association in Memphis, recommending the course of action which should be pursued in the matter by the sand and gravel industry.

Our committee held one meeting in Washington, D. C. As chairman, I have had several conferences with officers of the U. S. Chamber of Commerce whose experience in trade practice conference matters relating to other industries enabled them to give us helpful recommendations. Our committee has also studied the reports of the Federal Trade Commission, has examined carefully the trade practice rules promulgated by the Commission for application to other lines of business, and has conducted a great deal of correspondence for the purpose of securing complete information before the preparation of its report to the convention was undertaken. We feel that nothing has been left undone in our investigations which might have contributed to a more accurate report and we are indebted in a great measure to those who have assisted us in our studies.

Scope of Trade Practice Conference

The trade practice conference affords broadly stated, a means through which representatives of an industry voluntarily assemble, either at their own instance or that of the Federal Trade Commission, but under auspices of the latter, for the purpose of considering any unfair practices in their industry, and collectively agreeing upon and providing for their abandonment in cooperation with the Commission.

The procedure deals with an industry as a unit. It is concerned solely with practices and methods, not with individual offenders. It regards the industry as occupying a position comparable to that of "friend of the court" and not as that of the accused. It wipes out on a given date all unfair methods condemned at the conference and thus places all competitors on an equally fair competitive basis. It performs the same function as a formal complaint without bringing charges, prosecuting trials, or employing any compulsory process, but multiplies results by as many times as there are members of the industry, who formerly practiced the methods condemned and voluntarily abandoned. Mere attendance at a conference, or actual participation in the deliberations, is not taken as an indication that any firm or individual thus participating has indulged in the practices condemned at such conference.

As the procedure and its benefits have become understood, the trade practice conference has grown rapidly in favor with business and with industry. At the present time 94 industries of a wide and varied character have had trade practice conferences to govern competitive conditions in those industries. Many other industries have applied to the Federal Trade Commission for a trade practice conference, and they are now going through the procedure of agreeing upon the rules to be adopted. It would seem safe to assume that within a comparatively short time every major industry in the United States will have adopted, in cooperation with the Federal Trade Commission, a set of rules governing the business conduct of the individual members of the industries.

Procedure of Conference

When a trade practice conference is applied for, a preliminary inquiry is made by the Division of Trade Practice Conferences, the result of which serves as a basis for determining whether the practices or methods used are unfair to competitors or against the public interest, and whether the interest of the public is best served by calling a trade practice conference for the industry in question. The Commission is then advised regarding the facts and the law, accompanied by a recommendation as to the action to be taken with reference thereto. If the Commission determines on a trade practice conference, the industry is assembled at a specified place and time.

Such a conference may be called on the application of a representative group in an industry, or by the Commission on its own initiative. In either case the consensus of opinion of the entire industry is sought, and if a desire for such a conference is shown on the part of a sufficiently representative number, all members of the industry are invited to participate. A Commissioner of the Federal

* Report read at Memphis convention, National Sand and Gravel Association.

Trade Commission presides, but in order to give the widest possible range to the discussion of any practices which may be proposed, and to preserve the voluntary character of the conference, those present are encouraged to organize by electing their own chairman and their own secretary. The representatives of the Commission then withdraw.

After the industry has frankly examined and freely discussed any practice or method, the elimination of which would be beneficial and fair to all in the industry and to the public, resolutions are prepared which, in the judgment of the industry, are workable and enforceable. The presiding commissioner is then notified, and the resolutions are separately voted on and further discussed, if desired.

Enforcement of Trade Practice Rules

An interested industry is expected, therefore, to draw up a list of practices within that industry which are admittedly unlawful and then to agree to avoid those illegal practices. The industry is also expected to draw up a separate list of trade practices which, while not unlawful, or the legality of which has not been tested, are nevertheless declared to be uneconomic and destructive of the best interests of the industry. When this second list is approved by the Commission, or accepted as expressions of the industry regarding ethical practices, the members of the industry who agree to their adoption are expected to abide by them.

The first type of practices, which are definitely illegal, are called Group 1 rules; the second type are called Group 2 rules. Enforcement of Group 1 rules reposes in the Federal Trade Commission under the organic law creating that Commission. If the offender persists in violating a rule in Group 1, the Commission may proceed against him through the courts. Enforcement of Group 2 rules is largely a matter for the association of the industry, inasmuch as their violation does not constitute an illegal act. If complaint is made to the association that a member of the industry is refusing to abide by a rule in Group 2, and the Federal Trade Commission is requested to take proper action, it will communicate with the offender and inquire if it is his purpose to persist in his violation of the rule. In a majority of cases he will express his intention to comply with the rule in the future; but if he defies the Commission and persists in his determination to continue in the practice which his whole industry has declared to be unethical and unfair, then the Federal Trade Commission can take no action against him. But there still remains the moral force of the realization by the offender that he is engaged in a practice which the rest of his industry has declared to be unfair and improper. It is inconceivable that a man will persist in such violations and thereby invite the scorn and contempt of his associates.

Hugh Haddow, Jr., regional director, Millville, N. J.

The trade practice conference is predicted on the theory that the primary interest of the Commission is the interest of the public. The public is entitled to the benefits which flow from competition and each competitor is entitled to fair competition. The legitimate interests of business are in perfect harmony with the true interest of the public. That which injures one undoubtely injures the other, and the Commission, in the creation of the trade practice conference procedure, provides a medium through which, in appropriate situations, the interests of both may be mutually protected in matters of competitive practices. It also offers, in the conferences, a common ground upon which competitors can meet, lay aside personal charges, jealousies and misunderstandings, freely discuss practices of an unfair or harmful nature, or otherwise not in the public interest, reach a basis for mutual understanding and confidence, and provide for the abandonment of such practices into which they often drift unwillingly and without wrongful intent, to the mutual advantage of all and to the protection of the public.

Benefits Derived from Conference

The economy effected, the co-operation established by voluntary action, and the wiping out at one time from an industry of practices which the industry considers bad, has commended the trade practice conference procedure to both industry and the public. Studies of the U. S. Chamber of Commerce, incorporated in a report on trade relations, demonstrated that a great variety of unethical practices or trade abuses exist in dealings between members of an industry which, although many in number and widely different in character, are to be attributed largely to a state of distrust and misunderstanding between the parties concerned. In other words, certain well-known unethical business methods are pursued by one member of an industry because he suspects that his competitor is doing the same thing. If they could be brought together by an impartial agency, agree that each would cease the unfair practice in consideration

of the other party binding himself likewise, the industry would be purged of an evil which might well destroy it in time. Although there can be no true approximation of the cost to an industry and to the public of unfair business conduct, it must amount to a stupendous sum annually.

The beneficial results to business of elimination of unfair trade practices may be imagined if the time and money spent by parties in attempting to secure unfair advantages against one another were devoted to co-operative thought and effort to improve trade relations, each element in industry recognizing that it can best further its own prosperity by helping to build the prosperity of the business with which it deals. A state of warfare may bring temporary advantage to one side or another, but individual gains are equalized in the course of time and all industry finally bears the burden of strife.

Self-Regulation Involved in Conferences

Certain objections are usually offered to the form of co-operative effort involved in trade practice conferences. It is suggested, in the first place, that this is equivalent to an invitation to Government to meddle in private business. The contrary is true. Instead of bringing the Government into private business, the effect of a trade practice conference is to keep the Government out of business. Through a trade practice conference industry sets up its own standards of conduct which, if they serve adequately to protect the public interest, will remove all occasion for governmental intervention. Insofar as our industry provides for its own control, it will insure against the dangers of external interference.

No additional authority is conferred upon the Federal Trade Commission by a trade practice conference. Anything that the Commission can do after a conference it could have done equally as well and with the same effect if the conference had not taken place. The jurisdiction of the Commission extends to the elimination of unfair methods of competition in any line of business, and it derives this authority from the organic law creating the Commission enacted by Congress in September, 1914.

Necessity Dictates Conference

There is the impression in some quarters that trade practice conference rules are nothing more than glorified codes of business ethics, subject to the criticism that they contemplate an idealism which practical conditions made impossible of attainment. But that is not true; codes of business ethics may be safely ignored at the will of the individual, while a trade practice conference has behind it the strength of enforcement. Once our conference has been completed, we shall be able to enlist the agencies of the Federal Trade Commission in our endeavor to relieve the business of objectionable trade practices. Our action in going to the Commission, however, must be voluntary and the request for a conference must come from us; it is not an order of the Commission.

It is quite proper to state that trade practice conference rules suggest the existence of ideal conditions. But we should not forget that ideals reflect an understanding of what experience has shown is the wisest policy for business to adopt, and they point the way for business to proceed if it wants to build soundly for the future and to maintain a level of prosperity which adverse circumstances cannot budge. If we have no ideals in the sand and gravel business, then destructive practices, persevered in without any restraint, will destroy us. A determination, then, to ask for a trade practice conference is dictated by stern necessity.

A trade practice conference is a serious undertaking. Never before has a question of greater importance been presented to our industry. We must consider the matter intelligently and every producer must be fully informed with respect to every detail of the procedure, for otherwise its effect will be lost and the conference would be a futile gesture.

Cost of Cleaning and Repairing Railroad Cars

(*Continued from page* 63)

adopted jointly by the carriers and shippers to accomplish the following:

Minimize the expense of cleaning and repairing railroad cars.

Minimize the expense now being borne by the railroads in maintaining types of cars unsuited to service.

Minimize claims for losses of material in transit due to leaking cars.

Improve the safety of railroad operation, as it should not be overlooked that leaking cars have been known to derail trains.

We have pledged our cooperation to the railroads in carrying out any program which may be decided upon for securing the above results.

In closing I want to express the appreciation of your committee of the hearty support given it by the sand and gravel industry as well as the crushed stone and slag industries. We further wish to express our appreciation of the very cordial reception given us by the American Railway Association.

Enjoys Reading Pit and Quarry

Formerly I had been with the Goldburg Construction Company building concrete roads, and I have done everything in that line.

I thoroughly enjoy reading PIT AND QUARRY as I get a good many ideas from its columns.

Yours truly,

(Signed) Jos. M. Leonard.

Ready-Mixed Concrete, Possibilities for Producers* II

By STANTON WALKER,
Director, Engineering and Research, National Sand and Gravel Association

IN THAT part of the article published on page 57 of the February 12 issue of PIT AND QUARRY, *Mr. Walker presented many of the vital factors to be considered when embarking in the ready-mixed concrete industry. He discussed the stability of the industry, the field for ready-mixed concrete, the size of a community to support a ready-mixing adjunct to an aggregate plant, the means of determining the capacity of a plant and the capital necessary, and briefly pointed out the necessary equipment.*

In this issue, we are pleased to publish that part of the paper that deals with the selection of the type of equipment, effect of transportation on the quality of concrete and some hints on the control of the quality of concrete. The paper goes into considerable detail to show that the aggregate producer is the logical manufacturer of ready-mixed concrete and that the ready-mixed concrete plant operator is in an ideal situation to take advantage of the most exacting methods of designing and controlling the quality of concrete.

Ready-mixed concrete was one of the most interesting of all the subjects discussed at the Sand and Gravel Convention. The reading of the paper "Some Characteristics of the Ready-Mixed Business," by H. F. Thompson, on page 31 *in this issue and the above paper by Mr. Walker elicited more discussion than any session of the Convention. At the close of the discussion, John Prince, regional director, said that the establishment of a ready-mixed concrete division of the Sand and Gravel Association will be considered, and a motion was made by Mr. Shiely and seconded by Mr. Bliss that action in the matter of forming such a division be authorized.*

Selection of Type of Equipment

The relative merits of different combinations of equipment is a much discussed subject. Should a central mixing plant with equipment for transporting the mixed concrete be used or should truck mixers and a batching plant be established? No answer to this question will be attempted. Before the introduction of agitators, the truck mixer had an obvious advantage so far as flexibility is concerned. With their introduction, however, this advantage was eliminated, or at least reduced to a negligible quantity for normal hauls. Perhaps a summary of the limitations of each will be helpful.

The open truck, with no equipment for agitation is, of course, the most economical form of transportation. It is limited in radius of operation and type of concrete which it can haul. Stiff concrete, with a slump of, say, about 2 in. or less, can be delivered satisfactorily in almost any truck. Plastic concrete will segregate if hauled any considerable distance in such trucks and will require remixing before use. An important feature of them, however, is that they can be readily used for other service.

The "agitator" is a truck designed to haul concrete from a central mixer to the job and to agitate it in transit to avoid stiffening and segregation. It will permit of almost any practicable length of haul with concrete of a wide range in consistency. However, some loss in plasticity must be expected on account of evaporation and absorption of water. Some of these may be used to haul other materials and some permit of removing the bodies and replacing with ordinary ones. All of them seem to be giving satisfactory results so far as quality of concrete is concerned. A discussion of their relative merits would involve much personal opinion, the accuracy of which would depend, to some degree at least, on local conditions.

A truck mixer is a portable mixer which requires only a batcher plant to serve it. Concrete of any plasticity can be hauled for any distance, since the water does not need to be added and the mixing action started until the job is neared or reached. They also, in some cases, have been used to haul other materials. The transportation and maintenance costs of a truck mixer are, of course, higher than for the ordinary truck, and probably, also higher than for the agitator type. Several truck mixers have been developed and others are in the process of development. There is, perhaps, more room for difference of opinion as to the economy of different truck mixers than of different agitators.

In suburban districts, where the length of haul may be excessive, a batching plant with truck mixers offers many advantages. In urban districts, where the yardage is high, the number of truck mixers required to make adequate deliveries makes the investment a subject for serious consideration. Some operators have considered a combination of the central mixing plant and the truck mixer to be advantageous, the latter being used for excessively long hauls and for jobs where the plasticity of the concrete is important. At least one operator of a central mixing plant has found it necessary to

*Paper presented before the National Sand and Gravel Association convention, Memphis, Tenn.

equip his yard with a dry batching plant to fill orders for batched materials; this batcher could, of course, be used for truck mixers.

Effect of Transportation on Quality

Tests of concrete specimens, molded at various periods after the concrete was mixed, furnish ample evidence to show that considerable latitude may be permitted in the time elapsed between mixing and depositing the concrete without damaging its strength. Records are available which show practically no reduction, and in some cases increases, in strength of concrete hauled, from two to three hours in a truck equipped with an agitating device.

Control of Quality of Concrete

The ready-mixed-concrete operator is in an ideal situation to take advantage of the most exact methods of designing and controlling the quality of concrete. He can and should install the necessary facilities for accurate proportioning. He should provide facilities for protecting concrete against cold weather, in localities where such protection is needed. Since the production of concrete is his principal business he can familiarize himself with the most advanced information which has been developed in the laboratory concerning concrete.

It would be of interest to discuss the different methods of proportioning concrete which have been advanced, but that is a complete subject within itself, however, a few fundamental principles may be stated.

Aggregate comprise about 70 per cent of the weight and 80 per cent of the volume of the average concrete and it is not surprising that their quality plays a most important part in the quality of the finished concrete. The first essentials of an aggregate are that it be clean and consist of durable particles. Well graded aggregates are necessary to the production of economical concrete and uniformity in grading is essential to uniform concrete.

For given materials, the most important factor in controlling the quality of the concrete is the quantity of mixing water in relation to the cement. For workable concrete, given conditions of curing, the strength of the concrete is fixed by the ratio of water to cement. Well graded aggregates, rich mixtures, and dry consistencies require less mixing water than poor gradings, lean mixtures, and sloppy concrete, and hence produce higher strengths.

The ready-mixed concrete operator is in a position to design concrete of a specified strength and he should take full advantage of this fact wherever possible. Furnishing concrete on the strength basis rather than one of arbitrary proportion affords the principal opportunity for him to realize returns on his knowledge of concrete. The practice of specifying concrete by strength rather than proportions will come when the operator has demonstrated his ability to control quality.

Up to the present time there does not seem to have been any coordination of enterprise in the development of this industry. There have been no means for interchange of information or for working together for the betterment of the industry and the prosperity of the company. With the almost unlimited expansion of the program which seems to confront ready-mixed concrete, it should be well to keep in mind that other problem will be encountered in the future.

Resume of Activities of Committee C-1 on Cement of the A. S. T. M. for the Year 1929

By the Chairman, P. H. BATES, Chief, Clay and Silicate Products Division, U. S. Bureau of Standards.

During the last annual meeting of the Society, Committee C-1 on Cement held several important meetings at which revisions of the present standards of the Society for portland cement were discussed. The revision was of particular moment in that it recognized two cements instead of one. One of these covered the new high early testing portland cements, the other material corresponding to the present standard portland cement with, however, raised requirements for the tensile strength.

At a subsequent meeting of the committee in September modified revisions were considered whereby the strength requirement of the regular standard portland cement would be increased. A new tentative specification for high early strength portland cement was also prepared. This specification differs from that for standard portland cement only in requiring higher early strengths than demanded for the standard portland and at earlier ages, and permitting of a greater amount of sulfuric anhydride.

In the meantime, this committee has been continuing its studies of new methods of testing portland cement, covering particularly the question of the use of wetter mortars and also the preparation of specifications covering plastic cements.

The Cement Reference Laboratory established by the American Society for Testing Materials through Committee C-1, at the Bureau of Standards, started active work about June. There are now five on the staff of this Reference Laboratory, two of whom spend the greater part of their time in the field inspecting the equipment used by the various cement testing laboratories and offering instruction in methods of testing cement according to the standards of the Society.

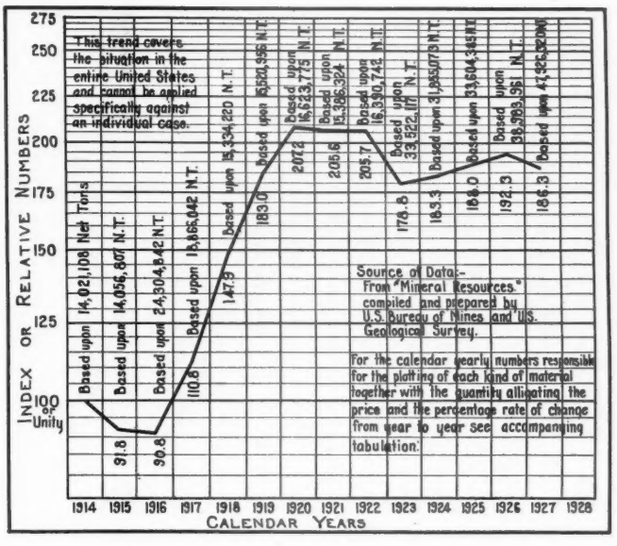
Determination of True Price-Trend in Railroad Ballast

By WILLIAM E. OBERLE, Engineer Analyst

THE writer is endeavoring, in the present instance, to ascertain and establish a true price trend for railroad ballast in the period 1914 forward in the entire United States. The semi-logarithmic chart and tabulation herewith are the results. These are based entirely upon the work and data of the U. S. Bureau of Mines and U. S. Geological Survey as contained in their publication "Mineral Resources of the United States." The analysis, study, statistical and graphic presentation and collation is the work of the writer.

All of the prices shown in the tabulation for each kind of material are f. o. b. pits, quarries, mills, or nearest shipping points.

Under the crushed-stone classification, a miscellaneous group, which includes mica, schist, conglomerate, argillite, various light-colored volcanic rocks, and serpentine not used as marble, has not been included in the tabulated set-up, but the effect of the quantities and prices for this kind of material is included in the alligated prices for all crushed-stone, as a note in the tabulation column states.


INDEX OR RELATIVE NUMBERS
CALENDAR YEARS
This trend covers the situation in the entire United States and cannot be applied specifically against an individual case.
Source of Data:- From "Mineral Resources" compiled and prepared by U.S. Bureau of Mines and U.S. Geological Survey.
For the calendar yearly numbers responsible for the plotting of each kind of material together with the quantity alligating the price and the percentage rate of change from year to year see accompanying tabulation.

Price-trend curve for ballast materials

The conversion factors at the bottom of the tabulation for shifting the net-ton unit to a cubic-yard unit are based upon replies received by the aforesaid Governmental authority from the following:

Railroad Ballast—Data Abstracted from "Mineral Resources of the U. S."

Prices are f.o.b. pits, quarries, mills or nearest shipping points Calendar Years	GRANITE				LIMESTONE				SANDSTONE				TRAP ROCK (Basalt and related rocks)				GRAVEL 76% is washed and screened				SAND				Allocated price per net ton for all crushed stone, including miscellaneous	Allocated price per net ton for sand and gravel	Index or relatives, being an average of the relatives for all crushed stone sand and gravel.
	Net tons	Allocated price per net ton	Index or relative	Percentage rate of change from year to year	Net tons	Allocated price per net ton	Index or relative	Percentage rate of change from year to year	Net tons	Allocated price per net ton	Index or relative	Percentage rate of change from year to year	Net tons	Allocated price per net ton	Index or relative	Percentage rate of change from year to year	Net tons	Allocated price per net ton	Index or relative	Percentage rate of change from year to year	Net tons	Allocated price per net ton	Index or relative	Percentage rate of change from year to year			
1914	852181	.645	100.0	.....	8493830	.467	100.0	.....	235710	.501	100.0	.....	2322958	.634	100.0	.....	Assumed the same as for sand	.152	100.0	.....	2116429	.152	100.0	.....	.51	.152	100.0
1915	1197437	.578	89.6	−11.4	7884323	.457	97.9	− 2.1	338566	.608	121.4	+21.4	1947715	.613	96.7	− 3.3	No record.				2688766	.130	85.5	−14.5	.50	.130	91.8
1916	1158518	.502	77.8	−13.2	8088673	.451	96.6	− 1.3	305866	.589	117.6	− 3.1	1101958	.691	109.0	+12.7	13649827	.130	85.5	.....	.....	.....	.....	.....	.49	.130	90.8
1917	478667	.562	87.1	+12.0	6579905	.516	110.5	+14.4	240779	.615	122.8	+ 4.4	1019475	.807	127.3	+16.8	10260999	.170	111.8	+30.8	.....	.....	.....	.....	.56	.170	110.8
1918	371900	.888	137.7	+58.0	5509911	.708	151.6	+37.2	171542	.834	166.5	+35.6	1023440	1.079	170.2	+33.7	8064505	.220	144.7	+29.4	.....	No record for these intermediate years		.....	.77	.220	147.9
1919	577001	.772	119.7	−13.1	4805060	.795	170.2	+12.3	327960	.904	180.4	+ 8.4	973779	1.135	179.0	+ 5.2	8715842	.300	197.4	+36.4	.....			.....	.86	.300	183.0
1920	601480	.983	152.4	+27.3	5388670	.995	213.1	+25.2	449530	1.095	218.6	+21.1	984210	1.281	202.1	+12.9	9081815	.320	210.5	+ 6.7	.....			.....	1.04	.320	207.2
1921	325340	1.275	197.7	+29.7	4734620	.914	195.7	− 8.1	349060	1.166	232.7	+ 6.5	927450	1.264	199.4	− 1.3	8949274	.330	217.1	+ 3.1	.....			.....	.99	.330	205.6
1922	482660	.915	141.9	−28.2	4879850	.873	186.9	− 4.5	505500	.801	159.9	−31.3	1290180	1.062	167.5	−16.0	9053502	.360	236.8	+ 9.1	.....			.....	.89	.360	205.7
1923	608870	.886	137.4	− 3.2	8004340	.826	176.9	− 5.4	700370	.741	147.9	− 7.5	1697080	.990	156.2	− 6.8	22247307	.290	190.8	−19.4	.....			.....	.85	.290	178.8
1924	1042820	.867	134.4	− 2.1	7233570	.786	168.3	− 4.8	268560	.998	199.2	+34.7	1390630	1.030	162.5	+ 4.0	21340843	.310	203.9	+ 6.9	.....			.....	.83	.310	183.3
1925	1165770	.708	109.8	−18.3	9537370	.784	167.9	− 0.3	415000	.865	172.7	−13.3	1643760	1.068	168.5	+ 3.7	19485530	.330	217.1	+ 6.5	1269725	.284	186.8	.....	.82	.327	188.0
1926	1268620	.683	105.9	− 3.5	11029690	.797	170.7	+ 1.7	710140	.679	135.5	−21.5	2222560	1.061	167.4	− 0.7	22132079	.340	223.7	+ 3.0	1588852	.341	224.3	+20.1	.82	.340	192.3
1927	1594050	.696	107.9	+ 1.9	11330270	.774	165.7	− 2.9	835920	.820	163.7	+20.8	1921480	1.175	185.3	+10.7	28541924	.330	217.1	− 2.9	2979836	.279	183.6	−18.2	.81	.325	186.3
1928	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	To convert to cubic yard unit use 2,610 lb.				To convert to cubic yard unit use 2,459 lb.				To convert to cubic yard unit use 2,467 lb.				To convert to cubic yard unit use 2,639 lb.				To convert to cube yard unit use 2,820 lb.				To convert to cubic yard unit use 2,665 lb.				For authority of conversion factor see text.		

Fifty granite producers, reporting average 2,610 lb. per cu. yd.

Three hundred and twenty limestone producers, reporting average 2,459 lb. per cu. yd.

Thirty-two sandstone producers, reporting average 2,467 lb. per cu. yd.

Eighty-one trap rock producers, reporting average 2,639 lb. per cu. yd.

Five hundred and sixty gravel producers, reporting average 2,820 lb. per cu. yd.

Six hundred and seventy sand producers, reporting average 2,665 lb. per cu. yd.

Only twelve of the sand producers reported above 3,300 lb. and 22 reported above 3,000 lb.

The percentage rate of change from year to year of the plotted trend on the chart is shown below.

1914, — ... per cent	1921, — 0.8 per cent
1915, — 8.2 per cent	1922, No change
1916, — 1.1 per cent	1923, —13.1 per cent
1917, +22.0 per cent	1924, + 2.5 per cent
1918, +33.5 per cent	1925, + 2.6 per cent
1919, +23.7 per cent	1926, + 2.3 per cent
1920, +13.2 per cent	1927, — 3.1 per cent

In 1926 a special inquiry was made by the aforesaid Governmental authority to ascertain the extent of shipment of crushed stone sold or used by producers for concrete and road metal and for railroad ballast according to methods of transportation. Although the replies received were not entirely satisfactory, they indicated that about 57 per cent was shipped on railroads, 27 per cent by motor trucks, 15 per cent by boat or barge, and 10 per cent by teams, trams and other means. Railroad hauls ranged from 20 to 300 miles, 80 miles being about an average. Boat hauls were 20 to 350 miles. Motor truck shipments were 1 to 25 miles, averaging 10 to 12 miles.

In conclusion the writer wishes to insert a word of caution. The delineated trend is representative for the entire United States, and it should not be applied specifically against an individual case. If the latter purpose is in mind, use the material in the tabulation for the various component kinds of ballast usually met with on the average railroad.

New Borate Mineral Is Finding Commercial Use

Miners, prospectors, and mineralogists have so thoroughly searched every nook and cranny of the earth's upper crust that nowadays new minerals are seldom found, or where they are discovered, are apt to be rare, and to exist in small quantities of no particular commercial importance. Nevertheless, a new boron-containing mineral, discovered within the last five years, has been found in such quantities as to render its commercial exploitation possible, according to the Pacific Experiment Station of the United States Bureau of Mines, Department of Commerce.

The new mineral, which has been variously called Razorite or Kernite, is found in the Mojave desert of California, at depths some 600 to 800 feet below the present surface of the ground. The pure mineral is colorless, transparent, and occurs in lamellar or columnar form. It contains the oxide of boron and of sodium, together with some water, and in places is of high purity, but differs markedly in physical properties from the ordinary borax of commerce. Its constitution has been of great interest to the chemist, who has hitherto known only the normal crystallized sodium borate, which contains ten molecular proportions of water to one of borate, and the octahedral sodium borate, with five molecular proportions of water. Both of these forms are readily soluble in water, the former being the sort found in nature as the result of the natural evaporation of alkaline lakes. The octahedral form is unstable with respect to water at ordinary temperatures, and is not found in nature, but can be prepared in the laboratory by crystallization above 142 degrees Fahr. Chemists have not succeeded in preparing the new mineral form in the laboratory, for although it contains from 3½ to 4 molecular proportions of water, it is dissolved in water only with considerable difficulty. It seems probable that the material is a product of volcanic activity. One of the larger uses for the borate is in the manufacture of certain special glass, and for glazes of sanitary ware.

Has Served the Cement Industry for Semi-Century

On the Men of the Industry page of this issue, we present the portrait of a cement operator who is prominent in the southern industrial world, and especially popular in his native city, San Antonio, Texas.

Charles Baumberger was born in 1863. At the age of 17 he began working for a pioneer firm, the Alamo Portland and Roman Cement Co., as bookkeeper, office boy, mule feeder and in other menial capacities. But he found satisfaction in worthwhile accomplishment, although denied a university education for which he yearned.

The Alamo plant produced from eight to ten barrels of cement per day in 1880. In four years he became manager of this company under its reorganization into the Alamo Cement Co. In 1890 he purchased a substantial interest in this growing company and became secretary in addition to manager. He was made president of the company in 1897, when it was again reorganized, this time as the San Antonio Portland Cement Co.—its present title.

Mr. Baumberger is celebrating his fiftieth year of continuous activity in the cement business, all in a single community. The average production of his company is stated as 3,600 barrels daily.

Functions of The Cement Institute And Its Membership

TO PROMOTE the best interests of the cement industry by providing facilities for collecting, through voluntary action, information with respect to trade and commerce therein, and by disseminating such information among its members is the chief purpose of The Cement Institute, an association of portland cement manufacturers, with headquarters at 11 E. 44th St., New York, N. Y.

The information thus collected and disseminated concerns credits, actually closed specific job contracts or other contracts for future delivery of cement, productions, stocks on hand of clinker and cement, shipments, cloth-sack returns, and any further trade data as may be desired.

The Institute promulgates a code of business ethics among its members, maintains such lawful trade customs and usages as seem advisable, and furthers plans for the general development and improvement in the industry.

Membership is open to any person, firm, or corporation regularly engaged in the manufacture and sale of portland cement. The officers of the Institute are:

President—Blaine S. Smith, president, Pennsylvania-Dixie Cement Corp.

Vice-president and treasurer—Morris Kind, president, Hercules Cement Corp.

Vice-president—M. C. Monday, president, Hermitage Portland Cement Co.

Vice-president—Chas. Irvin, vice-president, Alpha Portland Cement Co.

Vice-president—J. A. Lehaney, vice-president and manager, Lone Star Cement Co. (Kansas).

The above officers, together with the following, are members of the Board of Trustees:

G. S. Brown, president, Alpha Portland Cement Co.

George F. Coffin, treasurer and general manager, Nazareth Cement Co.

Charles Schmutz, vice-president, Bessemer Cement Corp.

Col. E. M. Young, president, Lehigh Portland Cement Co.

The following are members:

Allentown Portland Cement Co.; Alpha Portland Cement Co.; Ash Grove Lime & Portland Cement Co.; Basic Products Co.; Bessemer Cement Corp.; Consolidated Cement Corp.; Crescent Portland Cement Co.; Cumberland Portland Cement Co.; Dewey Portland Cement Co.; Edison Portland Cement Co.; Florida Portland Cement Co.; Georgia Cement & Products Co.; Giant Portland Cement Co.; Glens Falls Portland Cement Co.; Hawkeye Portland Cement Co.; Hercules Cement Corp.; Hermitage Portland Cement Co.; Lehigh Portland Cement Co.; Lone Star Cement Co., Alabama; Lone Star Cement Co., Indiana; Lone Star Cement Co., Kansas; Lone Star Cement Co., Louisiana; Lone Star Cement Co., New York, Inc.; Lone Star Cement Co., Pennsylvania; Lone Star Cement Co., Virginia; Manitowoc Portland Cement Co.; Medusa Portland Cement Co.; Missouri Portland Cement Co.; Monarch Portland Cement Co.; National Cement Co.; Nazareth Cement Co.; Newaygo Portland Cement Co.; Northwestern States Portland Cement Co.; Oklahoma Portland Cement Co.; Peerless Egyptian Cement Co.; Pennsylvania-Dixie Cement Corp.; Petoskey Portland Cement Co.; Pittsburgh Plate Glass Co.; Signal Mountain Portland Cement Co.; Southern States Portland Cement Co.; Southwestern Portland Cement Co.; Trinity Portland Cement Co.; Volunteer Portland Cement Co.; Vulcanite Portland Cement Co.; Wabash Portland Cement Co.; Wellston Iron Furnace Co.; West Penn Cement Corp.; Wolverine Portland Cement Co.

In addition to its New York office, The Institute has offices at present in Chicago, Illinois, and Kansas City, Mo.

Col. Wm. J. Donovan is counsel for The Institute, Luther G. McConnell is general manager, George H. Reiter is manager of the Chicago Division, and Baxter D. McClain is manager of the Kansas City Division.

The Institute's code of ethics is predicated upon the proposition that the portland cement industry owes a duty to the public as well as to its stockholders. This duty includes the obligation to deal fairly with labor, to manufacture its product efficiently, to promote its proper use, to eliminate waste, to sell at a fair price, to develop new uses, to approve and encourage sound and fair trade practices and to condemn and prevent bad, unfair practices.

Mica Output Increase In North Carolina

Recovering to some extent from the lowest production in five years, the North Carolina output of mica for 1928 increased by approximately 66 per cent in 1927, according to figures compiled by State Geologist H. J. Bryson in conjunction with the United States Bureau of Mines.

According to a report issued by State Geologist Bryson, the total value of mica produced in the state in 1928 was $198,344 as compared with $117,589 in 1927.

Of the total mica, $129,706 was in sheet material and $69,638 in scrap. This represents an increase in both kinds of the mineral with the scrap mica almost doubling in value last year over the twelve months before.

However, according to the state geologist, the mica industry is still in a depressed condition because of inability to meet foreign competition. He predicts that unless protection is placed on the industry that domestic mines will be forced to close within a few years.

"The prices of mica," he declares, "continue to decrease as a result of foreign competition. It is reported by mica producers and manufacturers that mica can be imported from India, South Africa and France cheaper than it can be produced at local mines. As a result of this condition, a great many of the mica finishing plants use the imported mica even though it is not as good mica as that produced locally."

Life Saving and Increased Efficiency Are Reviewed by U. S. Bureau of Mines

THE training of more than 81,000 men employed in the mineral industries in first-aid or mine-rescue methods was a feature of the educational campaign conducted by the United States Bureau of Mines, Department of Commerce, during the fiscal year ended June 30, 1929, in the endeavor to bring about safer and more healthful working conditions among mining, quarrying, metallurgical, and oil and gas workers, states Scott Turner, Director of the Bureau, in his annual report to the Secretary of Commerce. The number of these workers trained in the past fiscal year surpassed by more than 30,000 that attained in any previous year, and brings the total number so trained by the Bureau since its establishment to approximately 365,000. At many large mining operations, 100 per cent of the employees are being trained in these life-saving arts, resulting in substantial decreases in the number of accidents.

A significant step toward the solution of the economic problems of the mining industry has been taken in the preparation of numerous special reports of mining and milling methods and costs at representative mine operations in the different producing districts, as a result of which detailed data regarding conditions at these operations are made available to the entire industry.

Increasing attention was given during the year to mineral prospecting by geophysical methods, that novel development which is assisting in the discovery of important mineral deposits heretofore unknown. Subsidence of the surface in various mining districts has resulted in considerable damage to property, and this problem has been studied and helpful recommendations made.

Research was continued looking to the more efficient mining, treatment, and utilization of the numerous important nonmetallic minerals, which are widely used in the construction of buildings and highways. Special attention was given to the problems affecting the phosphate, bauxite, kaolin, and ocher industries. In the effort to discover commercial potash supplies in the United States, thereby relieving the American farmer of the domination of the fertilizer market by foreign interests, core drilling in the salt beds of New Mexico and Texas was actively continued. A study of the possibility of the marketing of potash salts derived from polyhalite, the principal potash mineral so far discovered, is being made. Under the provisions of bility of leucite, alunite, greensand marl, and other potash-bearing materials are being made.

The bureau is continuing its studies designed to assist the great petroleum industry in the development of methods of production whereby more than 20 per cent of the oil in underground deposits can be recovered, and in devising processes by which larger percentages of motor fuel and other commercial products may be obtained in the refining of petroleum.

Data obtained from the operation of the experimental oil-shale plant, Rifle, Colo., which was closed on June 30, 1929, should assist materially in solving problems connected with the possible establishment of an American oil-shale industry. The bureau's safety program has been extended to the oil and gas industries, and in the Seminole (Okla.) field alone 3,000 men were given first-aid training.

The new helium production plant near Amarillo, Texas, began operation in May, 1929, and, at the close of the fiscal year, was in steady, successful operation, producing this rare, noninflammable, non-explosive gas at a price approximately one-half that previously charged the Army and Navy for use in dirigibles, and at a figure much lower than has ever before been attained anywhere.

In addition to studying the scientific and technical problems of the mineral industries, the bureau is giving increased attention to economic conditions and problems. This involves the collection and dissemination of statistical data regarding the production, consumption, distribution, and storage of the numerous essential minerals.

Alaska Produces Marble and Limestone

The U. S. Geological Survey, in its estimates of 1929 mineral production states that the output of marble in Alaska came, as heretofore, entirely from the quarries of the Vermont Marble Co., on Prince of Wales Island. The mining of certain limestone deposits on Dall Island, in southeastern Alaska, by the Pacific Coast Cement Co., as a source of one of the constituents of its cement, was successfully continued throughout the year. The raw material after preliminary crushing is shipped to the company's main plant near Seattle.

Uses of Sand and Gravel in Low-Cost Road Construction*

By C. N. CONNER,
Engineer Executive American Road Builders' Association

GRAVEL roads are furnishing service to more square miles of territory than all other types of surfacing combined. More than 52 per cent of the total surfaced mileage of the United States is gravel. Whenever materials are locally available, gravel surfaces are found from Maine to California and from Louisiana to Alaska. Climatic and geographic conditions, although affecting the quality of service, do not prohibit its usefulness.

When constructed with suitable aggregate and maintained perpetually, safe speeds of 40 to 60 miles per hour can be maintained on them for hours at a time. Untreated gravel surfaces are seldom satisfactory for more than 600 vehicles per day. The average appears to be about 400, arid regions report 200 or 300 to be the maximum; and Alaska, with its damp soils, reports no trouble from the dust nuisance. When the traffic capacity of a gravel surface is passed, loss of surfacing material, dust, corrugations and pot holes indicate the necessity of surface protection.

Gravel surfaces are being successfully surface treated and their traffic capacity doubled. They have proved to be of value as a sub-base for pavements and they are still the predominating type of surfacing.

Seventy-nine per cent of all the highways in the United States are earth roads. This percentage means that 2,390,000 miles are unsurfaced highways. Beyond a doubt, 1,000,000 miles of these earth roads will be surfaced with gravel and other low-cost types of construction.

The unsurfaced mileage included in state highway systems is not decreasing at an appreciable rate and those in the county systems are increasing. Consequently, the importance of developing efficient types of low-cost road surfaces is apparent and urgent. The principal requirement of such roads is that they shall furnish service every day in the year at a relatively low cost.

Traffic surveys by Dr. McKay in Wisconsin, a state with many miles of gravel roads, disclose that an appreciable increase in land values occurs when unimproved earth roads are transformed into all-weather roads, but that a corresponding increase in land value does not occur when these same all-weather roads are changed into paved roads.

The whole situation is tersely stated by Harry S. Kirk, formerly director of the Ohio State Highway Department, who, after directing the construction of hundreds of miles of low-cost roads in Ohio, stated: "There may perhaps be those who call themselves engineers who frown upon the low-cost road because it is dusty, because it causes greater tire wear than pavements, because the grades are steeper or narrower or the curves a bit sharp in places. Such theorists should be marooned on a mile of good pavement sandwiched between ten-mile stretches of ungraded mud road, left thus because all the funds available have been spent on the mile of ideal section, and compelled to fight their way out, day in and day out, jeered and cheered on their journey from mud hole to mud hole by the natives mudbound through the lack of common sense shown by these pseudo-economists."

According to studies made in the state colleges of Washington, Iowa and North Carolina, motorists pay annually a bad road tax equivalent to 22.3 cents on every gallon of gasoline consumed on a poor highway in the United States.

Definition of Low-Cost Road

Just what is a low-cost road? Formerly by some it was considered as a temporary expedient to serve until funds for the construction of high-type pavements became available; by others it was a nine-foot section of concrete, or sheet asphalt or brick. Both of these ideas are in error, according to those who have carefully studied the facts and who are successfully building and maintaining low-cost roads.

The true low-cost surface is one which is placed upon a graded roadway of such width as will take care of the traffic for years to come with but little additional expenditure of funds other than for increasing the carrying capacity of the road itself.

The Economic Selection of Type

The transportation system of each state as a whole must be studied, and this includes United States Highways, State Highways and County Highways. A true determination and selection of type can then be made. For example, if the survey shows that any road will carry 1,500 or 2,000 vehicles per day within the immediate future, or that the traffic will consist of a relatively large number of heavy trucks, then the need for a high-type surface is apparent; but if the traffic will be relatively light in volume or in weight, then the economy of a low-cost road is evident. This low-type surface

* Read before the Sand and Gravel Association, Jan. 28, 1930.

should be such that gradual improvement of the surface can be made as the traffic may increase. This is known as progressive or stage construction, and gravel surfaces are well adapted to this method.

During the past three years, there has been a tremendous impetus given to this character of construction. It has been realized that to provide immediate and satisfactory transportation facilities to the traveling public, insufficient funds are at hand to construct all the needed roads with the old orthodox types such as brick, concrete, asphalt and penetration macadam; engineers and highway officials have, therefore been casting about to determine ways and means of constructing a satisfactory wearing surface at a lower cost.

The test of a low-cost surface is met when the annual maintenance cost is less than the difference between the fixed charges on such a surface and that of a high type. For example, if a concrete surface costs $30,000.00 per mile and has a fixed annual charge of $2,400.00 per mile per year because of interest and sinking fund requirements, and a low-cost surface requires $5,000.00 per mile with a fixed charge of $400.00 per mile per year, the low-cost surface is economical, provided the annual maintenance cost is less than the difference between the two, or less than $2,000.00 per mile per year.

Suitability of Gravel for Low-Cost Roads

Materials which are suitable, as proved by usage, for low-cost surfaces include a long list. Among them are gravel, stone, slag, sand-clay, chert, shale, disintegrated granite, limerock, marl, caliche, shell, cinders, mine tailings, and several others. Gravel predominated in all cases when it is available.

There are two general classes of gravel—one which contains a natural binder such as clay, and the other which is "clean" and contains little or no cohesive binder. Both are successfully used for surfacing. It is noticeable that the gravel surfaces containing binders become pot-holed under traffic, while those containing little or no cohesive binder and a relatively high percentage of sand become corrugated.

Recent tests at Washington State College in Pullman, Wash., have shown that corrugations on gravel roads are greatly reduced or eliminated by the use of balloon tires on automobiles and that shock absorbers are nearly as effective. Improved construction and maintenance methods and a more careful selection of the gravel itself are also making gravel roads more serviceable than ever before.

Methods for Improving Gravel Roads

Among the many improvements which make for better gravel roads, the following are selected, and it is definitely certain that their usage will increase the popularity of this type—

1. Use a wide surface 18 ft. in width and preferably more. Wide sections are desirable because of easier maintenance with blader or drag, a wider and safer distribution of traffic, less tendency to form or travel in ruts and less undesirable shoulder material becomes mixed with the selected surfacing material.

2. Use relatively low crowns of from ¼ to ⅜ in. per ft. Steep crowns are dangerous to traffic; they create a tendency to the formation of ruts. Distribution of traffic over the entire surface is unusual on roadways having steep crowns. Greater erosion occurs with steep crowns on untreated surfaces and skidding on treated surfaces is more frequent.

3. The treatment of clay subgrades with cold bituminous materials before applying gravel has, in Minnesota, resulted in a reduction of dust, reduction of frost boils, reduction in loss of gravel to ditches, reduction of loss of gravel into subgrade, and permits a 2 to 4 in. thickness, which renders service equal to that furnished by gravel courses 8 in. thick when laid on similar subgrades which are not oiled.

4. Gravels which are difficult to bind under rolling or traffic have been stabilized under traffic by the addition of non-slaking binders such as slag, limestone, screening, and volcanic cinders.

5. Gravels containing a relatively high percentage of sand or laid on sandy subgrades do not compact readily and become corrugated under traffic. They need a cohesive binder in the mixture.

6. Angular aggregates are preferred because they become locked in place under compaction and are less easily displaced because of their increased friction. Crushed gravel gives better service than round gravel.

7. The maximum size for gravel in many specifications does not exceed 1 in. and there is a marked tendency toward ¾ in. as the maximum. This is because of easier manipulation and maintenance with the smaller sizes, smoother riding qualities and a more densely compacted surface.

8. Clay gravel surfaces which become pot-holed by traffic may be improved by adding fine clean gravel for the top wearing course.

9. Nearly all untreated gravel surfaces are dusty. Calcium chloride has been found effective for reducing dust and loss of surfacing material. In regions of low humidity it is not satisfactory and when applied to relatively porous gravel surfaces it filters through to the subgrade and its effectiveness is reduced.

10. Bituminous surface treatments of gravel roads have passed the purely experimental stage and are in the period of practical usage. There are two principal methods of treating with tars and asphalts, one by the surface application method and the other by the mixed-in-place method. Both are excellent but the mixed method is gaining in popularity. Information is available for the proper selection and application of each.

11. The treatment with bitumens of uncompacted gravels, or those gravels which are unsuitable for treatment because of the character of the binder or aggregate which they contain, has resulted in some failures. Such failures can be greatly reduced in number because many of these surfaces if well compacted may be used as base courses for a covering of selected crushed gravel mixed with bitumen.

Unfortunately, existing knowledge of ways and means for improving gravel roads is not sufficiently utilized and there is too great a lag between the establishing of facts and their utilization. The possibilities for increased business in your industry are here and now as shown by the increasing mileage of excellent low-cost gravel roads in many states and in the majority of counties.

MEN OF THE INDUSTRY

The portrait printed on this page in each number of PIT AND QUARRY is selected without significance as to current events or the position of the individual in the industry.

Charles Baumberger
President and General Manager
San Antonio Portland Cement Company
San Antonio, Texas

Sand, Gravel and Gypsum in Kansas

The gypsum deposits of Kansas comprise extensive beds of rock gypsum and a number of deposits of secondary gypsum or gypsite. Some of the rock gypsum is suited to the manufacture of the finer grades of plaster of Paris, and the gypsite is particularly adapted for wall and other coarser grades of plaster, according to Bureau of Mines Information Circular 6,173.

Excellent facilities favored gypsum plaster manufacture in Kansas, and as railroads served each of the three areas—in the north at Blue Rapids in Marshall County, in the central part at Gypsum City in Saline County and Dillon in Dickinson County, and in the south at Medicine Lodge, in Barber County—the industry became more and more important. Today, however, the industry has died out in the central part of the state, both in Saline and Dickinson Counties.

Secondary gypsum deposits were first utilized in Kansas. Discovery was made in 1873 near Gypsum City, but this deposit was not worked for plaster until 1889, and was abandoned about 1893. For a number of years the darker color of plaster made from gypsite hindered its sale, especially since the whiter plaster obtainable from the rock was regarded as stronger. With the construction of the ornamental buildings at the World's Fair in Chicago, this earthy gypsum plaster was found to be adapted to staff work and large amounts were so used.

The first deposits of rock gypsum worked in Kansas were in the northern area. The first mill was erected at Blue Rapids in 1872. This mill was operated by Coon and Son until 1884, when it changed hands; in 1889 a flood caused considerable damage to the property, and it was abandoned. In 1887 a frame mill of one-kettle capacity was built on the west side of the town of Blue Rapids, at what was known as the Fowler mine, and was called the Blue Rapids Plaster Co. The Great Western Plaster Co. and the Blue Valley Plaster Co. also worked gypsum deposits in the vicinity of Blue Rapids prior to 1900.

To the southwest of Blue Rapids, at Solomon, Dickinson County, the Crown Plaster Co., which later became consolidated with the Kansas Cement Plaster Co., operated until 1898, when it was abandoned due to the great depth of the deposit and the intermingling of shale with the gypsum. Further south at Hope the Kansas Cement Plaster Co. operated a mine and plant for the manufacture of wall plaster.

The southern gysum area is the largest in Kansas, and with its continuation into Oklahoma and Texas forms the largest gypsum area in the United States. At Medicine Lodge in Barber County the Best Brothers plant manufactures hard plaster for shipment to nearly all markets in the United States, so well known are its qualities.

At present there are three companies operating in Kansas, the United States Gypsum Co., the Certain-tee Products Co. at Blue Rapids, and the Best Brothers Keene's Cement Co. at Medicine Lodge.

Measuring the Speed Of Dynamite

One of the most rapid chemical reactions known takes place when a stick of dynamite is detonated. It has been found that the detonation wave travels along a cartridge of dynamite at speeds as high as 4 miles a second. These speeds are measured at the Explosives Experiment Station of the United States Bureau of Mines, Department of Commerce, at Bruceton, Pa., in connection with research and testing of mining explosives.

In one type of apparatus, known as the Mettegang recorder, the time elapsing between the breaking of two wires threaded through the explosive is recorded on a rapidly revolving smoked drum. In a method recently developed, the explosive is placed behind a narrow slot cut in a sheet of armor plate and the detonation procon a rapidly moving film. This method has the advantage that it reess is photographed by its own light cords the speed of the detonation wave at every point along the column of explosive. It has been found that the speed of gelatin dynamites is affected by the degree of confinement under which the charge is fired. A column of gelatin dynamite confined in a steel tube may detonate at a speed several thousand meters per second faster than a similar charge detonated in the open.

The suitability of an explosive for a given blasting operation depends to some extent on its rate of detonation, hence, a study is being made by the Bureau of Mines of the speed of dynamites when detonated under confinement closely approximately that obtained in actual blasting.

Testing Field Samples

The testing of explosives to determine their permissibility for use in gaseous and dusty coal mines is one of the most important duties of the engineers at the Pittsburgh Experiment Station, United States Bureau of Mines, Department of Commerce. Permissible explosives must originally pass gallery tests which simulate severe conditions under which explosives may be used in coal mines; a friction test to determine whether the explosive is unduly sensitive to the shocks and friction to which it may be subjected in use, and efficiency tests which measure its strength.

To insure that the quality of these explosives is maintained, the engineers of the Bureau of Mines from time to time re-examine samples of permissible explosives obtained from the user's magazines. The samples are then tested to determine how closely they conform to the samples upon which the permissibility tests were originally made. Chemical and physical items which exceed prescribed tolerances are brought to the attention of the manufacturer in order that he may apply a remedy. A particular lot of a permissible explosive is declared nonpermissible if it fails to pass any of the safety tests. Both the manufacturer and user are notified of the results of the safety tests on field samples.

Mineral Output Lower In North Carolina

Value of the output of minerals and mineral products in North Carolina for 1928 slumped about 2 per cent from that of the previous year, H. J. Bryson, state geologist, cooperating with the U. S. bureau of mines, recently announced. Mr. Bryson's report shows the value of minerals and mineral products was $12,355,934 for 1928, as compared with $12,569,433 in 1927, a decrease of $215,499.

With the drop of $689,000 in the value of output of building and highway construction materials, the decrease in mineral production is more than is accounted for in the granted total of output.

In most other branches of the mineral industry aside from building and construction materials, Geologist Bryson pointed out that increases were reported in 1928 over previous years. Brick and tile output dropped from $3,934,494 in 1927 to $3,387,043 in 1928, and granite dropped from $4,562,879 to $4,416,518. The greatest slump in mineral productions was in sand and gravel, which went from $871,416 to $531,092.

Sand and Gravel Production Continues to Increase

The production of sand and gravel in this country in 1928 amounted to 209,118,868 short tons, valued at $119,207,937, according to the United States Bureau of Mines, Department of Commerce. This was an increase of 6 per cent in quantity and of 3 per cent in value as compared with the output of 1927. These increased figures are in part due to a special canvass for new producers throughout the country, which was conducted by the Bureau.

The sand production was 97,737,717 short tons, valued at $56,132,406; gravel production was 111,381,151 short tons, valued at $63,075,531.

New York led all the States in quantity and value of sand and gravel production, with 21,109,864 short tons, valued at $12,572,634. Illinois was second in quantity, its output amounting to 20,969,331 short tons, valued at $10,243,555. California was third, with 15,969,132 short tons, valued at $8,698,884, and Michigan was fourth, with 15,893,090 short tons, valued at $6,828,431. Ohio, Pennsylvania, Indiana, and Wisconsin were next in order in quantity of production. Pennsylvania was second in value of production, with Illinois third.

About 77 per cent of the total production of sand and gravel was reported as washed and screened.

Sand and Gravel Sold or Used by Producers in the United States, 1927-1928

	1927		1928	
	Short tons	Value	Short tons	Value
Sand:				
Glass	2,171,693	$3,257,790	2,310,828	$3,435,645
Molding	4,914,975	4,458,508	4,781,765	5,089,969
Building	40,737,377	22,198,767	45,629,207	24,116,772
Paving	35,606,622	17,767,491	35,244,544	17,305,750
Cutting, grinding, and blast	1,686,762	2,193,690	1,538,046	1,991,962
Fire or furnace	410,801	452,835	305,659	362,044
Engine	2,618,890	1,640,736	2,413,043	1,544,204
Filter	74,674	155,137	113,978	226,896
Other*	6,086,545	2,166,444	5,400,647	2,059,164
	93,588,339	54,291,398	97,737,717	56,132,406
Gravel:				
Building	30,432,031	21,947,666	34,747,235	24,071,208
Paving	44,891,975	29,887,365	49,088,786	30,697,993
Railroad ballast*	28,541,924	9,403,357	27,545,130	8,306,330
	103,865,930	61,238,388	111,381,151	63,075,531
Grand total	197,454,269	115,529,786	209,118,868	119,207,937

*Includes some sand used for railroad ballast and fills.
†Includes some gravel used for fills by railroads.

Sand and Gravel Sold or Used by Producers in the United States in 1928, by States

State	Short tons	Value
Alabama	3,315,985	$1,719,222
Arizona	566,777	282,996
Arkansas	1,683,384	991,408
California	15,969,132	8,698,884
Colorado	806,051	605,511
Connecticut	660,708	479,173
Delaware	68,615	50,209
District of Columbia	1,002,126	759,053
Florida	894,879	495,875
Georgia	744,948	310,569
Hawaii	3,570	10,710
Idaho	716,471	326,278
Illinois	20,969,331	10,243,555
Indiana	11,086,331	5,375,058
Iowa	3,423,619	2,094,955
Kansas	2,760,277	1,532,399
Kentucky	2,100,907	1,589,617
Louisiana	2,310,166	1,503,400
Maine	758,528	348,376
Maryland	2,602,142	2,409,544
Massachusetts	3,751,193	2,986,850
Michigan	15,893,090	6,828,431
Minnesota	4,409,245	2,029,091
Mississippi	3,012,291	1,428,548
Missouri	5,251,226	3,248,813
Montana	1,430,914	465,375
Nebraska	2,234,575	1,265,001
Nevada	201,992	150,966
New Hampshire	1,636,621	1,018,547
New Jersey	6,292,636	4,261,390
New Mexico	187,239	111,296
New York	21,109,864	12,572,634
North Carolina	971,746	531,092
North Dakota	624,700	135,200
Ohio	14,286,169	9,116,356
Oklahoma	2,827,810	1,426,258
Oregon	2,441,945	1,453,070
Pennsylvania	12,955,790	11,289,826
Rhode Island	192,862	56,610
South Carolina	507,716	341,391
South Dakota	2,461,963	1,301,075
Tennessee	2,939,541	2,157,515
Texas	8,007,392	4,602,421
Utah	1,000,131	544,020
Vermont	295,524	108,461
Virginia	1,602,444	1,081,948
Washington	5,917,748	2,001,195
West Virginia	2,383,659	2,773,341
Wisconsin	10,104,015	3,680,420
Wyoming	1,742,880	414,004
	209,118,868	119,207,937

1929 Mineral Output In Canada Gains

For the fourth successive year, the mining industry in Canada reached a new high record of output in 1929 when value of production totaled $303,876,000, or 10.5% more than in the preceding year, according to an estimate compiled by S. J. Cook. chief of mining, metallurgical and chemical branch of the Dominion Bureau of Statistics.

During the year new records were established in the output of asbestos cement, clay products, copper, gypsum, lime, gold, salt, stone, sand and gravel. The total increase in the mineral output in 1929 over 1928 was $28,887,000.

Non-metallics had a value of $21,205,000 as against $18,826,692 in the preceding year. The gain in this section was 12.6% or $2,378,000. Structural materials including brick, tile, cement, limestone, sand and gravel, valued at $55,228,000 as compared with $49,737,181 in 1928, showed a gain of 11% or $5,491,000.

In order of total values, the leading mineral products of Canada are coal, copper, gold, nickel, cement, lead, asbestos, clay products, silver, zinc, stone, natural gas, sand and gravel. Canada produces 85% of the world's asbestos.

Gypsum in Alaska

The production of gypsum in Alaska began about 1906, when the Pacific Coast Gypsum Co. began working the only known extensive deposit in southeastern Alaska, according to R. M. Santmyers, Mineral Specialist, Bureau of Mines. This deposit is situated in the eastern part of Chichagof Island, about a mile from Iyoukeen Cove. The gypsum beds apparently overlie the Carboniferous rocks which are exposed along the southeastern shore of the cove. Gypsum also occurs in the bottom of the valley, but as the valley is deeply filled with gravel the limits of the gypsum have not been ascertained.

The mine shaft is 315 feet deep, with levels at 75, 160, and 300 feet from the surface. For 11 years the company mined on the second level, working over an extensive area. In 1917 mining was done on the 300-foot level. From the mine bins (1,200 and 2,500 tons capacity) the gypsum was taken by tram cars to the wharf and dumped into a 2,000-ton bin. Shipments of crude gypsum were made by barges to Tacoma, Wash., where the manufacturing plant was situated. It was calcined and manufactured into various grades of wall plaster, plaster board, and plaster blocks.

NEW CORPORATIONS

Sewell Lime Co., Orofino, Idaho. To develop limerock deposits on Lime mountain.

Verona Sand & Gravel Co., Stoughton, Wis. $50,000. F. R. Hyland, H. C. Peterson, F. M. Lipke.

T. E. Stephenson Sand & Gravel Co., Jackson, Miss. $30,000. T. E. Stephenson, Pres.; L. H. Stephenson, Sec.; both of Monticello, Miss. Plant at Monticello, Miss.

Guadalupe Gravel Co., Senator A. J. Wirtz, Pres., Seguin, Tex. 2,500 shares n.p.v. R. A. Jahns, Paul Schriewer.

Hornell Gravel Co., Hornell, N. Y. $50,000. To produce sand and gravel at Alfred Station, N. Y.

Baden Sand Co., C. F. C. Arensburg, Treas., c/o Patterson, Crawford, Arensburg & Dunn, attorneys, 1712 Oliver Bldg., Pittsburgh, Pa. $5,000. W. C. Gourley.

Feltes Coal & Gravel Co., Joseph M. Feltes, North Aurora, Ill. $30,000. Leonard C. Feltes.

Angeles Gravel & Supply Co., c/o Trumbull, Severyns & Trumbull, attorneys, Port Angeles, Wash. $250,000. E. E. Nichols, Dick Owens, Fred Owens.

St. Albans Sand Co., F. H. Sattes, St. Albans, W. Va. $10,000. F. L. Sattes, Franz Sattes, L. P. Harvey.

Millmont Quarry, Reading, Pa. $20,000. Walter R. Hollinger, Treas., Jacob L. Miller, Reading.

National Talc Co., c/o F. A. Palmer, 110 W. 40th St., Rm. 701, New York, N. Y. $1,000,000.

Fuller's Earth Corp. of America, c/o F. A. Palmer, 110 W. 40th St., Rm. 701, New York, N. Y. $1,000,000.

Kaolin Corp. of America, c/o F. A. Palmer, 110 W. 40th St., Rm. 701, New York, N. Y. $1,000,000.

Delphos Quarries Co., E. H. France, Delphos, Ohio. 1,000 shares pfd., $100 p.v.; 1,000 shares com., n.p.v. A. C. Hirth, M. G. Leatherman.

L. A. Ottaway Slate Co., L. A. Ottaway, 701 N. Main St., Wichita, Kans. $10,000. Gladys R. Ottaway, Otto R. Souders, Fred Naumunk, Ellen Tornquist.

Skagit Talc, Inc., 730 Liggett Bldg., Seattle, Wash. $99,000. R. J. Stockdale, Pres., 10316 Rainier Ave., Seattle, W. P. Stockdale, Sec.-Treas., 6740 Sixteenth St., Seattle; J. B. McLean, V. P., Sedro-Woolley, Wash.; William F. Pooler, Mgr., Rockport, Wash. Plant at Rockport, Wash.

Municipal Project Utilizes Long Belt Conveyors

ENGINEERING practices in any industry can be studied, advantageously, by operators in other industries that have some features in common. Thus the methods adopted with success by civil engineers in handling large quantities of earth are worthy of notice by men in the non-metallic mineral industries. In the following case, belt conveyors are being used to move about five million cubic yards of earth within the city of Seattle, Wash., as part of a project for civic improvement, known as the Denny-Hill regrade.

Scow unloading in deep water.

The contract was awarded to George Nelson and Company, which is using Link-Belt anti-friction belt conveyor equipment throughout, and have 300 working days in which to complete this stupendous undertaking.

The work is in full swing. An electric crawler shovel bites deeply into the hill, taking 2 cu. yd. to the bite, and drops its load into a hopper, which in turn feeds its contents onto the 36-in. wide movable belt conveyor, where the gray stream of earth starts —a constant monotony of motion—for its ultimate destination at the bottom of Elliott Bay; or the conveyor delivers, if desired, to railroad cars or trucks, if the earth is to be used as fill.

It would be less of a drama if, in the swift continuously-flowing, even progress, there were noise, the crash and clatter of gears, or the bumping and falling of rocks striking iron or timber. But the conveyor is almost silent. Night and day it conveys a stream of earth, never stopping, never speeding, never slowing, as the hill melts under the magic of energy and brains of man. The earth travels on a belt-conveyor system running overhead, clearing street-car trolley wires, without interfering with traffic, or with Seattle's general business, to Seattle's ocean doorstep. The long straight run of overhead conveyor discharges onto the pier conveyor, which runs at an angle, out to the end of the pier, where the stream of earth tumbles onto barges which are huge scows, of self-dumping construction. These are moved out into the bay to discharge their load in deep water.

Each scow is built reversible, with two decks for alternate loading, and intermediate chambers for water or air. When ready to dump, inlet valves are opened, introducing water to the chambers, to throw the scow out of balance, and to thus permit it to dump as it capsizes. After the water is pumped out, the reversed deck is ready for a new load.

The big cut is being made in two benches, two shovels operating at the top bench making a cut of about 40 ft. Two other shovels operate on the lower level, which is on the grade-line. Belts are 36 in. wide, operate a speed of 500 f.p.m., and have a capacity of more than 600 cu. yd. per hour. When the project is completed, the field or portable conveyors now feeding to the main-line conveyor, will be running in the opposite direction, having turned gradually around the junction point, to an angle of 180 deg. from starting position.

Movable or field conveyor for feeding main-line conveyor.

The lengths of the different conveyor sections are 1,360 ft., 920 ft., and 600 ft. centers, and the field conveyors are 200-ft. centers. The portable or movable hoppers are fitted with apron feeders, which are so timed as to deliver the 2-cu. yd. load onto the belt before the shovel can return with another load.

New Gravel Plant For Moline, Ill.

The Moline Consumers Sand and Gravel Company headed by James C. Pearson of Moline, Ill., has announced its intentions of erecting a sand and gravel plant in Rock Island county, a short distance below the Meredocia bridge and not far from Albany or Cordova. These sand and gravel beds are considered most productive of fine materials, the deposit being of a depth of 25 to 30 feet at many points.

The erection of the plant will follow later during the year and expects to be able to care for 2,000 tons of the product daily. The Consumers has been active in this district for several years and have purchased acres of the farm land of the vicinity. Beder Wood Co. have also extensive fields along the river.

RECENT PATENTS

American Patents

Burning

Continuous calcination of gypsum. Alva W. Tyler, Monterey Park, Cal. No. 1,746,294.

Cement Manufacture

Process of cement manufacture. Reed W. Hyde, Summit, N. J., assignor to Dwight & Lloyd Metallurgical Co., New York, N. Y. No. 1,746,944.

Conveying and Elevating

Bucket-elevator. William L. Hancock, Dallas, Tex., assignor to Murray Co., same place. No. 1,746,649.

Crushing

Screen-bar for crushing machinery. Oscar Anderson, Philadelphia, Pa., assignor to Pennsylvania Crusher Co., New York, N. Y. No. 1,746,512.

Screen-bar for crushing machinery. James E. Stine, Aldan, Pa., assignor to Pennsylvania Crusher Co., New York, N. Y. No. 1,746,563.

Cleaning device for coal-breakers. John A. Plimpton, Winnetka, Ill., assignor to Pennsylvania Crusher Co., New York, N. Y. No. 1,746,555.

Excavating

Excavating device. John W. Page, Chicago, Ill. No. 1,747,130.

Excavating dipper. Walter E. Miley, Marion, O., assignor to Marion Steam Shovel Co., same place. No. 1,745,436.

Excavating shovel. John W. Page, Chicago, Ill. No. 1,747,025.

Material Handling

Material-handling plant. Glen O. Morford, Berwyn, Ill., assignor to Roberts & Schaefer Co., Chicago, Ill. No. 1,746,359.

Mechanical loading shovel. Septimus R. C. Smith, Oneroa, New Zealand. No. 1,746,874.

Measuring and Mixing

Cellular stucco mix and method of making the same. Gustave A. New, Port Clinton, O., assignor to American Gypsum Co., same place. No. 1,745,635.

Measuring and dumping apparatus. William M. Venable, Pittsburgh, Pa., assignor to Blaw-Knox Co., same place. No. 1,745,777.

Mixing blade (for concrete mixers). John F. Ketchey, Dallas, Tex. No. 1,746,481.

Miscellaneous

Hydraulic coal and ore washing and separating machine. George F. Richards, White Haven, Pa. No. 1,746,557.

Method of producing sand-lime bricks. Harry W. Charlton, New York, N. Y. No. 1,745,601.

Steering mechanism. Charles B. King and Benjamin Jacoby, Marion, O., assignors to Marion Steam Shovel Co., same place. No. 1,745,995.

Pulverizing

Air separator. Thomas J. Sturtevant, Wellesley, Mass., assignor to Sturtevant Mill Co., Boston, Mass. No. 1,746,686.

Screening

Sand-riddle. George F. Naab and Alfred B. Waltz, Cleveland, O., assignor to North American Mfg. Co., same place. No. 1,746,958.

Screen. Frank C. Morrow, Wellston, O. No. 1,747,124.

Foreign Patents

Cement Processes

Manufacture of sulphuric acid and artificial portland cement. H. Meuris. British 324,199.

Process for retarding and regulating at will the setting of cements. Societe Lap. French 678,554.

Process and equipment for calcining the excess calcium oxide present in cement. Klockner Werke A. G., A. Malignani and C. Malignani. French 678,636.

Drilling

Water tube for rock drills. Ingersoll Rand Co. British 319,339.

Hammer rock drills and like percussive apparatus. L. Pryce. British 324,265.

Cradles for rock drills. Ingersoll Rand Co. British 323,848.

Controlling device for rotating mechanism for rock drills. Baron Marks (Ingersoll Rand Co.). British 323,963.

Pneumatic tools. Baron Marks (Ingersoll Rand Co.). British 323,968.

Explosives

Blasting explosive. Hercules Powder Co. Canadian 297,297.

Excavating Machinery

Power shovels. Baron Marks (Goodman Mfg. Co.). British 323,771.

Crushing and Grinding

Cone crusher. Nordberg Mfg. Co. Canadian 297,327.

Apparatus for feeding material to intermediate chambers of compound mills. G. Polysius A. G. French 678,813.

Improvements in pulverizers. P. Gauthier. French 678,633.

Screening

Improvements in screening of dry materials. C. W. H. Holmes, I. L. Bramwell, and the Bertley Iron Works, Ltd. French 688,725.

Material Handling

Apparatus for conveying solid materials through pipes by means of compressed air. T. F. Miller. British 324,103.

Apparatus for pneumatic transport of pulverized materials. A. Lacore. French 679,055.

Miscellaneous

Concrete mixer. The Leach Co. Canadian 297,308.

Feeder for concrete mixer. Teodulo Fusoni. German 484,884.

Artificial marble. S. Kin. British 324,038.

Sand blast apparatus. J. Y. Johnson. British 324,213.

Sheave block. S. H. H. Parsons. Canadian 295,894.

Optical pyrometer. Compagnie pour la Fabrication des Compteurs et Materiel d'Usines a Gaz. German C 35,765.

Brake-shoe material of cement with small addition of micro-asbestos. Wilhelm Staby. German St. 44,827.

Process for production of pumice-stone concrete blocks. Jakob Adolf Hermann. German 115,056.

Stone saw. Otto Burkhardt. German 486,485.

PIT AND QUARRY will furnish, at its actual cost, a copy of any patent cited below. A charge of ten cents per copy is made by the U. S. Patent Office, Washington, D. C., and readers may procure a copy directly by addressing the Commissioner of Patents, with payment for copies requested. Postage stamps are not accepted by the Patent office. We will endeavor to obtain copies of foreign patents for our readers but we cannot give assurance in every case for the reason that copies of such patents are not printed for distribution as liberally as are the American copies, nor is theer a fixed charge per copy.

MANUFACTURERS' PUBLICATIONS

Each publication listed below contains information of interest to non-metallic mineral producers. Readers may obtain, without charge—except where a price may be stated—and without obligation, copies of any of these publications by writing directly to the manufacturers who publish them. Please mention PIT AND QUARRY *when making such requests.*

Belting

What Does the Pulley Think of the Belt? 8 p., 2 ill. (Folder. E. F. Houghton & Co., Philadelphia, Pa.) Features Vim leather belts and tells a unique story under the above caption.

Indestructible, the Heavy-Duty Conveyor Belt. 4 p., 5 ill. (New York Belting & Packing Co., New York, N. Y.) Folder giving examples and statements of unusual conveyor belt performance.

Bucket Loaders

Details of the Leahy Vibrating Screen as Adapted to a New B-G Bucket Loader. 4 p., 7 ill. (Folder No. 42LVS-929 MW. Barber-Greene Co., Aurora, Ill.) Discusses the feasibility of using a Leahy screen with the B-G bucket loader and includes a drawing of the portable unit.

Cable

The Hercules Record. 20 p., 23 ill. (Jan., 1930. A. Leschen & Sons Rope Co., St. Louis, Mo.) The text and illustrations are confined to different uses of wire rope, especially the world's highest bridge, 1,050 ft. above the Arkansas River and the work on U. S. Route No. 24, Indiana.

Castings, Steel

How Lebanon Stops a Hidden Leak That Wears Away Your Profits. 4 p., 7 ill. (Folder. Lebanon Steel Foundry, Lebanon, Pa.) Features Circle L. steel castings, especially as used in the Ashcraft power control valve.

Cement

Monolith Mixer. 6 p., 10 ill. (Quarterly Publication. Monolith Portland Cement Co. and Monolith Portland Midwest Co., 213 W. Seventh St., Los Angeles, Cal.) Specializes in educating the consumer in the use of cement, Monolith in particular, and illustrates some Monolith jobs.

Volunteer Cement. 32 p., 20 ill. (Volunteer Portland Cement Co., Knoxville, Tenn.) Gives a short history of cement manufacture, its present constituents and outlines the superiority of Volunteer cement and service.

Compressors

Types WN-24 and WN-33, 240 and 330 cu. ft. Gas Engine Driven Air Compressors. 12 p., 19 ill. (Catalog No. 800. National Brake & Electric Co., Milwaukee, Wis.) Describes and illustrates this type of portable air compressor.

Types WN-C110 and W-C165 Portable Engine Driven Air Compressors. 12 p., 15 ill. (Pub. No. 852, National Brake & Electric Co., Milwaukee, Wis.) Treats the 110 and 165-cu. ft. compressors and shows their uses.

Vertical Simplex Power Driven Compressors Type P6. 8 p., 8 ill. (Bulletin 788. Second edition. Chicago Pneumatic Tool Co., New York, N. Y.) Gives information on the construction, installation and care of these compressors which may be belt-driven, short-belt-driven or direct-driven through a flexible coupling.

Concrete Bodies

RMC Carriers. 4 p., 4 ill. (Bulletin KCX. Good Roads Machinery Co., Kennett Square, Pa.) These carriers for transporting ready-mixed concrete are described and the different reasons for their success are carefully outlined.

Costs

An Easy Method of Determining the Cost of Operating Electric Appliances and Motors. 4 p., 11 ill. (GEA-1158A, supersedes GEA-1158. General Electric Co., Schenectady, N. Y.) Features a chart to determine the cost of operating electric appliances and motors.

Crushers

Bulldog Gyratory Crusher Type T. 34 p., 34 ill. (Bulletin No. 3100, supersedes 2100. Traylor Engineering & Mfg. Co., Alletntown, Pa.) Discusses the theory of crushing, gives the integral parts and shows and describes the largest crusher in the world.

Drills

The Armstrong Driller. 8 p., 11 ill. (Feb. 1930. Armstrong Manufacturing Co., Waterloo, Ia.) Continues the history of the portable well drill, this issue containing the fifth installment.

Drives

Ramsey Silent Chain Drives. 87 p., 95 ill. (Catalog No. 628. Ramsey Chain Co., Albany, N. Y.) In addition to the illustrations and description, this catalog includes a number of tables which are of considerable value to the engineer.

Dump Wagons

LaPlant-Choate Three-Way Dump Wagon. 8 p., 15 ill. (Catalog LaPlant-Choate Manufacturing Co., Cedar Rapids, Ia.) Shows the uses of this dump wagon and illustrates its integral parts.

New-Way Air-Cooled Engines. 20 p., 31 ill. (Catalog No. 11. The New-Way Motor Co., Lansing, Mich.) Discusses the qualities of New-Way engines and shows drawings of different units.

Engines

Heaters

Stationary Feedwater Heaters. 12 p., 12 ill. (Bulletin W-210B-1. Worthington Pump and Machinery Corp., Harrison, N. J.) Describes the Worthington open-type heaters of the Types N and N-D Series.

Hoists, Hydraulic

Heil Quality News. 4 p., 19 ill. (Jan.-Feb., 1930. The Heil Co., Milwaukee, Wis.) Devoted to illustrating and discussing the uses of Heil hydraulic hoists.

Lubrication

The Relation of Carbon Residue to Lubricating Performance. 12 p., 9 ill. (Lubrication, Jan., 1930. Texas Company, New York, N. Y.) A complete discussion of the forming of carbon and offers suggestions for its reduction.

Machinery, Used

Good Used Machinery for Crushing, Pulverizing, Filtering and Drying. 8 p., 12 ill. (Bulletin No. 10. Consolidated Machinery Co., New York, N. Y.) Gives listing of all types of these machines and information on the 6-acre plant at Newark, N. J.

Zelnicker's Bulletin of Oil Engines. 6 p., 1 ill. (Folder No. 402. Walter A. Zelnicker Supply Co., St. Louis, Mo.) Features a large selection of oil engines and calls attention to its 48-page Bulletin 400, showing many exceptional values in all classes of new and rebuilt machinery.

Metals, Perforated

Perforated Metals for Elevator Buckets, Light and Heavy Steel Plate Construction and Especially Screens. 60 p., 61 ill. (Catalog. Hendrick Manufacturing Co., Carbondale, Pa.) Shows different applications of perforated metal and compares it with woven wire screen.

Motor Control

Practical Pointers on the Selection of Motor Control. 32 p., 29 ill. (Cutler-Hammer, Milwaukee, Wis.) Gives the uses of this type of control and stresses the desirability of exercising caution in selecting a motor control.

Motors

Synchronous Motors. 86 p., 137 ill. (GEA-1191. General Electric Co.,

Schenectady, N. Y.) Describes and illustrates some of the results of 40 years' experience in this field of electrical advancement.

Safety

Wilson Personal Protective Products for Industry. 32 p., 48 ill. (Catalog No. 29. Wilson Products, Inc., Reading, Pa.) Is devoted to all classes of goggles, helmets, masks, respirators and other protective equipment.

Separators

The Raymond Mechanical Separator for Reducing Grinding Costs and Improving Quality of Output. 4 p., 2 ill. (Raymond Bros. Impact Pulverizer Co., Chicago, Ill.) Discusses the adaptability of the machine and its different advantages.

Federal Laboratory Air-Separating Unit. 4 p., 8 ill. (Bulletin No. 25. Federal Pneumatic Systems, Inc., Chicago, Ill.) Deals with the applications of this air-separating unit, which has no screens and no moving parts.

Service

Seven Plants to Serve You. 2 p., 2 ill. (*Amsco Bulletin.* Jan. 1930. American Manganese Steel Co.) Illustrates the plants and describes the services and equipment offered by the company.

Shovels

Full Revolving Convertible Power Shovels. 16 p., 39 ill. (Catalog R-3. Bay City Shovels, Inc., Bay City, Mich.) Discusses the Model R, ¾-cu. yd. 26-ton machine. The description is very complete and illustrations show the many duties of this fast-working convertible shovel.

Slurry Agitation

The Minogue Agitator. 1 p., 2 ill. (Manitowoc Engineering Works, Manitowoc, Wis.) Describes the new agitator and gives its advantages.

Tools, Electric

Electric Tools for Maintenance and Production in Every Industry. 40 p., 111 ill. (Catalog No. 20, 1930. Black & Decker, Towson, Md.) Illustrates and describes electric tools for all purposes.

Speed Reducers

Herringbone, Helical, Worm and Spur Speed Reducers. 60 p., 77 ill. (Catalog No. 50, Palmer-Bee Company, Detroit, Mich.) Contains drawings, illustrations, and descriptions of the different types manufactured by this company and their applications to different duties, together with useful tables.

Valves

Nordstrom Valves. 156 p., 173 ill. (Catalogue No. 7, Merco Nordstrom Valve Co., Subsidiary of Merill Co.) Describes and illustrates the "Merco" Nordstrom valves and their application to industry.

Washers

Elmore Continuous Counter Current Washer. 2 p., 3 ill. (Elmore Centrifugal Products Co., St. Louis, Mo.) Shows the application of this washer and line drawings of the parts.

Welding

Buda Gas-Engine Driven General Electric Type WD-300A Arc Welder. 2 p., 3 ill. (GEA-1009B supersedes GEA-1009A. General Electric Co., Schenectady, N. Y.) Describes an electric welding outfit, operated independently of the plant current.

Type WD-400A Arc Welder. 4 p., 10 ill. (GEA-876D supersedes GEA-876C. General Electric Co., Schenectady, N. Y.) Gives distinctive features and specifications of this arc welder and illustrates its operations.

Wire Cloth

Wire Cloth and Wire Screening for Sand, Gravel, Crushed Stone and Screens for Other Purposes. 4 p., 14 ill. (The New Jersey Wire Cloth Co., Trenton, N. J.) Illustrates different products which are fabricated with Roebling wire.

COMING EVENTS

Mar. 3-5, 1930. Chicago. National Management Congress, at Stevens Hotel. G. E. Pfisterer, manager, 308 W. Washington St., Chicago.

Mar. 3-7, 1930. Chicago. Industrial Equipment Exposition at Stevens Hotel. G. E. Pfisterer, manager, 308 W. Washington St., Chicago.

Mar. 3-7, 1930. Chicago. National Industrial Exposition at the Stevens Hotel. George Pfisterer, secretary, 308 W. Randolph St., Chicago.

March 4, 1930. La Salle, Ill. Portland Cement Association regional safety meeting, at Hotel Kaskaskia. A. J. R. Curtis, secretary, 33 W. Grand Ave., Chicago, Ill.

Mar. 5-7, 1930. Chicago. National Industrial Equipment Exposition sponsored by the Society of Industrial Engineers, the American Society of Mechanical Engineers, the American Management Association, the National Association of Cost Accountants, and the National Association of Foremen, at the Stevens Hotel. G. E. Pfisterer, manager, 308 W. Washington St., Chicago.

Mar. 5-7, 1930. Chicago. Third National Materials Handling Meeting, American Society of Mechanical Engineers, at the Stevens Hotel.

March 18, 1930. Des Moines, Ia. Portland Cement Association regional safety meeting, at Hotel Fort Des Moines. A. J. R. Curtis, secretary, 33 W. Grand Ave., Chicago, Ill.

March 19, 1930. Detroit. Regional meeting, American Society for Testing Materials, at Book-Cadillac Hotel. F. O. Clements, chairman, care General Motors Co., Detroit.

March 25, 1930. Kansas City, Mo. Portland Cement Association regional safety meeting, at Hotel Muehlebach. A. J. R. Curtis, secretary, 33 W. Grand Ave., Chicago, Ill.

Apr. 5-9, 1930. New York, N. Y.; Hoboken, N. J.; Washington, D. C. Fiftieth anniversary meeting, American Society of Mechanical Engineers, at American Machinist offices in New York; Stevens Institute, Hoboken; U. S. Chamber of Commerce Bldg., Washington.

April 7-11, 1930. Atlanta, Ga. Annual meeting, American Chemical Society.

April 15, 1930. Albany, N. Y. Portland Cement Association regional safety meeting, at Hotel Ten Eyck. A. J. R. Curtis, secretary, 33 W. Grand Ave., Chicago, Ill.

May 12, 1930. Cleveland, O. Meeting, Steel Founders' Society of America. G. P. Rogers, managing director, 932 Graybar Bldg., New York, N. Y.

May 29, 1930. Easton, Pa. Portland Cement Association regional safety meeting, at Hotel Easton. A. J. R. Curtis, secretary, 33 W. Grand Ave., Chicago, Ill.

June 16-25, 1930. Berlin, Germany. World Power Conference. World Power Conference Program Committee, Room 818, 29 W. 39th St., New York, N. Y.

June 24, 1930. Cleveland, O. Portland Cement Association regional safety meeting, at Hotel Cleveland. A. J. R. Curtis, secretary, 33 W. Grand Ave., Chicago, Ill.

June 26, 1930. Washington, D. C. Portland Cement Association regional safety meeting, at Hotel Raleigh. A. J. R. Curtis, secretary, 33 W. Grand Ave., Chicago, Ill.

July 1, 1930. Detroit, Mich. Portland Cement Association regional safety meeting, at Book-Cadillac Hotel. A. J. R. Curtis, secretary, 33 W. Grand Ave., Chicago, Ill.

Sept. 9, 1930. Seattle, Wash. Portland Cement Association regional safety meeting, at New Washington Hotel. A. J. R. Curtis, secretary, 33 W. Grand Ave., Chicago, Ill.

Sept. 16, 1930. San Francisco, Cal. Portland Cement Association regional safety meeting, at St. Francis Hotel. A. J. R. Curtis, secretary, 33 W. Grand Ave., Chicago, Ill.

PERSONAL MENTION

Max A. Berns, publicity manager of the Universal Atlas Cement company, a subsidiary of the United States Steel corporation, was re-elected chairman of the Advertising Council of the Chicago Association of Commerce on January 27. Associated with Mr. Berns as officers and directors of the Advertising Council are publishers of Chicago daily newspapers, advertising managers of large Chicago manufacturers and retailers, agency executives, direct mail producers, typographers and other groups covering the entire field of advertising.

In the engineering and construction field Mr. Berns has been identified with movements for winter building, for fire-safe construction, for grade separations and for wider roads and streets. He is a member of the executive committee of the Chicago Association of Commerce and of the general publicity committee of the association and is former chairman of division 15—contractors and building material—of the association. He is a director of the Chicago Better Business Bureau. He is a member of the advertising committee of the United States Steel corporation. He is a member of the Chicago Engineers club, Western Society of Engineers, American Society of Civil Engineers, Society of American Military Engineers, Engineering Advertisers association, National Industrial Advertisers association and International Direct Mail Advertising association.

Fred H. Haggerson, former vice-president of the two companies was elected to succeed O'Shea as president; and **F. P. Gormely** was elected vice-president and general manager of both companies.

George W. Maisak, well-known among users of crushing, cement and mining machinery, has joined the sales staff of Consolidated Products Co., of New York, and will confine his attention to the crushing, pulverizing and drying machinery department.

E. F. Schaefer, vice-president of Gardner-Denver Company, in charge of sales, has just finished a trip through the Northwest, visiting the various branch offices. **J. R. Farrell** has been transferred from the St. Louis office to the Tulsa office as rock-drill representative. **E. H. Diamonds**, formerly of the Andrews and George Co., agents in Japan, is associated with the San Francisco office as rock-drill salesman.

Gordon Huth has been appointed safety director for Universal Atlas Cement Co. He has been with the company fifteen years, eleven of these years as safety inspector at Duluth, Minn., where, in three different years, his plant won trophies with no-accident records. The company's accidents at all plants have decreased 94 per cent in ten years.

Wallace W. DuPre, for fourteen years sales manager of the Knickerbocker Company, Jackson, Mich., has purchased a substantial interest in the business of Thomas Brown, Inc., Baltimore, Md., and Washington, D. C., distributors of Knickerbocker concrete, mortar and plaster mixers and saw rigs, Keystone power shovels and Marlow pumps, and will make his headquarters in Baltimore. He retains his interest in the Knickerbocker Company, remains its vice-president and will give his general attention to the company's eastern sales.

Frank B. Wetherill is in charge of a new branch office of Link-Belt, Limited, at 510 W. Hastings St., Vancouver, B. C. Mr. Wetherill has been connected with the Link-Belt organization for fifteen years, recently as manager of the Portland, Ore., office and warehouse. This new office will supplement the service which has been rendered through Fleck Bros., Ltd., Canadian Fairbanks-Morse Co. Ltd., and A. R. Williams Machinery Co. Ltd., who will continue as official distributors.

Besides the facilities of Link-Belt Limited's large manufacturing works at Toronto and Elmira, Ont., Mr. Wetherill will have available the extensive plants, warehouses and engineering facilities of the Pacific Division, Link-Belt Company, the nearest shop and warehouse being in Seattle, Wash.

Thomas F. Farrell has been appointed chief engineer, Department of Public Works, Albany, N. Y., to succeed the late Col. William M. Acheson.

R. G. Richmond announces his resignation as general manager of Waterbury Company.

W. Earle Pashley, advertising manager of the C. F. Pease Company, 813 Franklin Street, Chicago, has been appointed assistant sales manager and second vice-president.

Michael D. Jones, of Allentown, Pa., has proceeded to Russia as a member of a large party of engineers serving the MacDonald Engineering Company of Chicago. This company has taken a contract from the Soviet government for the erection of cement plants in Russia. Mr. Jones has had a wide experience in such construction work.

Frank G. Smith, president of Portland Cement Association, spoke briefly, by radio, February 18, over the National Broadcasting network upon the remarkable influences that cement has had in our industrial progress during recent years.

C. C. Johnson of Marion, Ind., formerly connected with the Osgood Company, has been appointed district sales manager for Bay City Shovels, Inc., of Bay City, Mich., in charge of Indiana and Ohio territory.

C. H. Collier has been appointed district sales manager in charge of this company's sales in Texas with offices in the Burt Building, Dallas. **R. D. Allrich**, formerly of Chicago, will be located at the factory office in Bay City as agency sales manager in charge of all distributors in the Central District.

Sewell L. Avery, president of the U. S. Gypsum Company, has been elected a director of the Continental Illinois Bank and Trust Company of Chicago.

George J. Whelan, president and general manager, Kelly Island Lime and Transport Company, has been elected a director of the Lorain Street Savings and Trust Company.

Universal Atlas Announces Appointments

New appointments in the Universal Atlas Cement Company, a subsidiary of the United States Steel Corporation, are announced by **B. F. Affleck**, president, following the joining of the Universal Atlas organizations.

E. D. Barry, superintendent of the plant at Universal, Pa., is appointed assistant operating manager with offices in Chicago. Mr. Barry is a graduate of the Massachusetts Institute of Technology. He has been connected with Universal for more than 25 years,

Leonard Wesson, assistant general superintendent, Atlas division, is appointed assistant operating manager with headquarters in Chicago. In his new position Mr. Wesson will return to familiar ground, as he was formerly a member of the Universal organization. He has had more than 20 years' experience in the cement industry.

J. C. Witt, chemical engineer, is transferred from the Buffington, Ind., plant to Chicago. He is a graduate of Butler College, of the University of Chicago and of the University of Pittsburgh, taking his doctor of philosophy degree at the latter institution. For three years he was engaged in chemical research for the Portland Cement association and is the author of many articles on the subject. Mr. Witt has been with Universal since 1924.

T. A. Hicks, general chemist, Atlas division, is appointed to the same position with the new company, with offices in Chicago. For many years Mr. Hicks was associated with the Atlas company and has high standing in the technical and engineering world.

R. L. Slocum, who hitherto was assistant superintendent at the Universal, Pa., plant, is made superintendent. He is a graduate of Pennsylvania State college and was connected with the Carnegie Steel Company, another subsidiary of the Steel Corporation, until he came to Universal. Last year he was awarded the Judge Gary medal for 25 years' continuous service.

H. H. Lauer, engineer, Atlas division, who is appointed assistant chief engineer, Chicago, has been with the Atlas company several years. Previously he was connected with the Illinois Steel Company and related industries and has had extensive experience in the engineering field.

"All the appointees have demonstrated their fitness for their new positions by their previous records," said Mr. Affleck. "Their ability and experience will help to insure customers of the Universal Atlas Cement Company the same efficient and satisfactory attention they formerly received from the two separate companies."

Fred M. Kimball, 69, advisory manager of the motor division of the industrial department of the General Electric Company, died February 5, in Lynn, Mass. Mr. Kimball had seen many years of service with General Electric and was well known throughout the motor industry. He had been ill for some time.

Col. William M. Acheson, late state engineer, New York Dept. of Public Works

Colonel William M. Acheson, chief engineer, Department of Public Works, Albany, N. Y., dropped dead Feb. 25, at the Fort Orange Club. He was 55 years of age and recognized as a leading engineer of his state. He acquired his military title through service in the Spanish-American and World wars, and was buried with military honors.

Clarence W. Hodges, general purchasing agent of the Worthington Pump and Machinery Corporation, who was seemingly enjoying the best of health, was taken suddenly ill and died at the Paterson (N. J.) Hospital as a result of an operation. Mr. Hodges was born at Randolph, Vt., May 15, 1876, and was graduated from Williams College with the class of 1900. For some years he was employed by the American Locomotive Company as purchasing agent, and since 1918 he had been employed in the same capacity by the Worthington Corporation. He is survived by his widow and four sons.

George T. Houstain, chairman of the board, Western Crucible Steel Casting Co., died in Minneapolis, Minn., January 16.

Francis Cole Pratt, former vice-president and chairman of the manufacturing committee of the General Electric Company, died January 26 in New York City after an illness of six weeks. Born in 1867 at Hartford, Conn., he was graduated from the Sheffield Scientific School of Yale University with the degree of Ph.B. in mechanical engineering in 1888. After graduation he was associated with the Pratt and Whitney Company, machine tool manufacturers, of which his father was president and one of the founders, continuing with them until he became vice-president.

Mr. Pratt joined the General Electric Company in 1906 as assistant to E. W. Rice, in charge of manufacturing and engineering. He was made assistant to the president in 1913 and was elected vice-president in 1919. As vice-president he at first had charge of engineering and later of both engineering and manufacturing. He retired in 1927.

Method Produces Smooth Concrete Finish in Single Operation

A new method of placing concrete in one operation to achieve a perfectly smooth finish that presents the appearance of perfect masonry finish for exteriors and an absolutely smooth finish for interiors has recently been evolved and is being used at Los Angeles and Oakland, Calif.

The system, originated by the Scofield-Twaits Engineering and Construction Company, is exceedingly simple, comparatively inexpensive, and it saves the labor and time as well as the cost of refinishing the concrete surface. An excellent example of this new process is in the recently constructed factory building at 54 Avenue and Russel Street, Oakland, Calif. This is a three-storied structure of reinforced concrete, designed by Francisco and Jacobus, architects. Eight thousand cubic yards of concrete were furnished by the Hutchinson Company of Oakland, operating a fleet of eight Paris Transit Mixers, on this job, pouring an average of 400 cu. yd. in eight hours.

Here is how this masonry finish was obtained. Strips of molding were nailed to squares of pressed wood. These squares, about 4 ft. by 6 ft., were then placed in the forms and the concrete poured in the usual manner. After two or three days, the forms were taken down and the pressed wood squares used on another part of the job. The advantages of pouring and securing a perfectly smooth finish in one operation without added cost of finishing, are readily apparent.

On this job Transit system mixed concrete was used exclusively. The specifications called for the ordinary 1:2:4 mix with three per cent of diatomaceous earth.

FINANCIAL NEWS
CORPORATE & BUSINESS

The information contained in these financial pages is given with the understanding that any statement on the part of this magazine or any of its staff, as to the responsibility or standing of any person, firm or corporation, or as to the value of any property or securities is a mere expression of opinion, given as a matter of service to the readers of PIT AND QUARRY, *for which no responsibility in any way is to attach to this magazine or to any of its staff.*

Warner Company

The annual statement for 1929, covering approximately nine months operations of this sand, gravel and mixed-cement company, is shown below. No satisfactory comparison is available in view of the considerable change in size of the company's scope, for, during the year, the Van Sciver interests were acquired and Warner reports only the results shown below in the annual statement, April 8, 1929, to December 31, 1929.

Gross sales	$10,110,916
Costs	6,663,415
Depreciation and Depl.	937,730
Operating profit	$ 2,509,771
Sales expense	282,958
Administrative expense	227,444
Provision for credit losses	62,971
Discounts allowed	145,143
Net profit	$ 1,791,265
Interest and discount (cr.)	92,764
Gross income	$ 1,884,028
Interest paid	366,913
Amortizations, etc.	32,942
Federal taxes	133,967
Adjustments	32,076
Net income	$ 1,318,130
Interest times earned	4.7
Earned per share 1st pfd. (31,123 shares)	$42.50
Earned per share common (204,727 shares)	4.25
Common dividend	2.00
Extras in 1930	.50

Previously, a report for the period from April 8 to September 30, 1929 had shown net income of $1,091,334, equal, after preferred dividends, to $3.93 per share on the common. Accordingly it would appear that very little business, or at least profit, accrued to the company in the closing months of the year.

Warner operates mainly in the Philadelphia area and reports a good outlook for business, following the lull during the last part of 1929, with good activity in the line of public developments. The company is still further expanding, $1,250,000 having been appropriated for capital outlays during the last three months of last year, in a good measure to develop the central-mixed concrete business in and about Philadelphia.

Net income of approximately $100,000 was reported by the American Lime and Stone Company, an important operating subsidiary which is engaged principally in producing high-calcium chemical lime, sold to numerous manufacturers of chemical products. Warner enjoys a strong position in the sand, gravel and cement business, its predecessor having been established as early as 1794.

The balance sheet dated December 31, 1929 shows total current assets of $3,125,000, well over three and one-half times current liabilities of $833,000. Payables included no notes, cash amounting to $623,000, and secured demand and short-term notes to $470,000; these two items alone covering current liabilities by a good margin. Notes receivable were shown as $150,000 and accounts receivable as $1,050,000, accounts payable being only $160,000. Inventories are shown at the lower between cost and market, the carrying value being $860,000. The company carries its investments in controlled and other companies at a total of $562,000, showing its own property, after depletion and depreciation of $6,173,000, at $16,885,000.

The capitalization consists of a real-estate mortgage of $45,000; an issue of first mortgage 6 per cent bonds of $6,684,000; ground rent of $365,000; leasehold purchase contracts at $580,000; an issue of first preferred stock of 31,123 shares, an issue of second preferred of 57,500 shares, and 204,727 shares of common; the last mentioned carried on the balance sheet at $2,075,000. Surplus arising from the acquisition of other companies is shown at $496,000 and earned surplus at $361,000.

United States Gypsum Net Off

Unsatisfactory conditions in the building trades was reflected in a downward trend in the earnings of the United States Gypsum Company during 1929—it was revealed at the annual meeting of stockholders held Feb. 13, at which time share owners approved an increase in the authorized common stock to 3,000,000 shares of $20 par, from 1,250,000 shares.

The consolidated net income in 1929 after depreciation, depletion, taxes and all other charges was $5,102,305, equal, after preferred dividends, to $3.98 a share on 1,149,290 shares of common stock outstanding. This compares with a net income of $6,031,635, or $7.22 a share on 760,436 common shares, in 1928. The 1929 net is the lowest reported since 1923.

After the payment of cash dividends there was a surplus of $3,198,190 in 1929 as compared with $4,328,434 in the previous year. The profit and loss surplus at the close of last year was $30,684,764, in comparison with $27,193,274 the year before.

The consolidated balance sheet of the company, as of December 31, 1929, shows the maintenance of a strong financial position with current assets of $14,284,956 and current liabilities of $1,734,446, as compared with $16,276,738 and $2,957,160, respectively, the year before.

Inventories increased by nearly $1,000, while cash and government securities were off more than $2,800,000. Receivables were $1,200,000

COMPANY	CLASS OF STOCK	DIVIDEND RATE	HOLDERS OF RECORD	PAYABLE
Alpha Portland Cement	Preferred	1¾% qr.	Mar. 1	Mar. 15
Canada Cement	Preferred	1⅝% qr.	Feb. 30	Mar. 3
Canada Paving and Supply	1st Pfd.	1½% qr.	Feb. 15	Mar. 1
Cleveland Stone Quarries	Common	$0.75 qr.	Feb. 15	Mar. 1
Consolidated Sand and Gravel	Preferred	1¾% qr.	Jan. 31	Feb. 15
Consumers Co	Preferred	$3.50 S.	Feb. 10	Feb. 20
Consumers Co	Pr. Pfd.	$1.50 qr.	Mar. 15	Apr. 1
General Asphalt	Preferred	1¼% qr.	Feb. 15	Mar. 1
General Asphalt	Common	$1.00 qr.	Feb. 28	Mar. 15
General Refractories	Common	$0.75 qr.	Feb. 12	Feb. 26
Indiana Limestone	Preferred	1¾% qr.	Feb. 20	Mar. 1
Kentucky Rock Asphalt	Preferred	1¾% qr.	Feb. 15	Mar. 3
Lawrence Portland Cement	.....	1% qr.	Mar. 14	Mar. 30
Material Service Corp	.....	$0.50 qr.	Feb. 15	Mar. 1
Metropolitan Paving Brick	Common	$0.50 qr.	Feb. 15	Mar. 1
Peerless Cement	Preferred	$1.75 qr.	Mar. 20	Mar. 31
Raybestos Manhattan	Common	$0.65 qr.	Mar. 2	Mar. 16
Standard Paving Materials, Ltd	Preferred	1¾% qr.	Feb. 2	Feb. 15
Standard Paving Materials, Ltd	Common	$0.50 qr.	Feb. 2	Feb. 15
Superior Portland Cement	Class A	$0.27½ M	Feb. 2	Mar. 1
Texas Gulf Sulphur	.....	$1.00 qr.	Mar. 2	Mar. 16
Virginia Carolina Chemical	Pr. Pfd.	1¾% qr.	Feb. 17	Mar. 1
Wolverine Portland Cement	.....	$0.15 qr.	Feb. 5	Feb. 15
Worcester Salt Co	Preferred	1½% qr.	Feb. 10	Feb. 15

lower. The decline in current liabilities was due to the drop of nearly $500,000 in accounts payable and more than $725,000 in accruals.

Commenting on the operations in the last year and the prospects for 1930, Sewell L. Avery, president of the company, stated in his letter to stockholders:

"Expenditures for new plants, additions and improvements amounted to $11,254,534, which includes the construction started in 1928 of the new plants at Boston, Philadelphia, Alabaster and Chicago. The partial financing of these new plants through the issuance of rights to stockholders yielded $5,654,306 from the year's installments, the balance being provided out of earnings. These new mills were completed and put into production too late in the year to permit them to make a substantial contribution to earnings. The results already attained from their operation demonstrate the soundness, security and advantages of these investments.

"For many years the company has suffered from a general infringement of its wallboard patents and has incurred the expense of litigation in their defense. During the year these conditions have been corrected by arrangements for the payment to us of damages suffered and through the granting of licenses under royalty. The returns to be received, while substantial, are relatively of a minor amount. The major benefits anticipated are a relief from the disadvantages of and incident to legal contention, and the increased consumption of wallboard products which should follow the quality improvements that a full and uniform use of the patented methods and products should assure.

"The benefits expected from an improvement in market conditions occurring in the middle of the year were offset by a drastic decline in building which was first felt in August. While improvement is confidentially expected, it is obvious that, in the cities, in divisions important in our business, building has exceeded the present demand.

"Disclaiming ability to foretell the next year's developments at this time, it may be fairly stated that the general feeling in the organization is that we shall have, in 1930, a satisfactory and better year."

Texas Gulf Sulphur

The report of this large sulphur producer for the past year is given below. It is quite encouraging to note the excellent comparison made by the year 1929 with the previous three years and the exceptionally strong treasury position of the company. The demand for sulphur has been excellent this year and prices have been satisfactory.

Income Account for 1928 Compares as Follows:

	1929	1928	1927	1926
Gross income	$29,883,243	$26,083,612	$22,328,199	$18,152,030
Exp., fed. tax, etc	13,635,765	11,565,993	10,228,824	8,768,217
Net income	$16,247,478	$14,517,619	$12,099,375	$ 9,383,813
Dividends	10,160,000	10,160,000	10,160,000	7,620,000
Surplus	$ 6,087,478	$ 4,357,619	$ 1,939,375	$ 1,763,813
Previous surplus	15,301,082	10,943,463	9,004,088	7,240,275
*Profit and Loss surplus	$21,388,560	$15,301,082	$10,943,463	$ 9,004,088

*Includes depletion reserve.

Balance Sheet of Texas Gulf Sulphur Co. as of December 31, 1929, Compares as Follows:

	1929	1928	1927	1926
Land and dev	$10,383,589	$ 8,173,525	$ 6,728,749	$ 2,844,568
Plt., equipment, etc	13,270,189	10,769,204	7,421,549	6,272,679
Mat., sup. and sulp. inv	8,731,960	7,893,947	8,665,879	7,456,555
Cash	5,713,141	4,413,960	4,044,171	5,492,710
Accounts rec	2,552,685	2,176,397	1,585,290	1,626,000
Notes and accep. receivable	405,439	244,275	89,364	65,984
Misc. rec. and adv	176,307	152,370	87,304	50,636
Def. assets	63,306	41,270	34,721	34,564
Total	$41,343,616	$33,911,948	$28,689,386	$23,874,555
LIABILITIES				
*Cap. stock	$ 6,350,000	$ 6,350,000	$ 6,350,000	$ 6,350,000
Accts. pay., etc	1,305,926	601,665	1,180,486	587,891
Depr., res., etc	8,467,162	8,467,162	8,467,162	8,467,162
Fed. tax. and cont. res	3,831,968	3,192,039	2,275,165	1,312,919
Surp. incl. depl. reserve	21,388,560	15,301,082	10,943,463	9,004,089
Total	$41,343,616	$33,911,948	$28,689,386	$23,874,555

*Represented by 2,540,000 no-par shares.

The report of Texas Gulf Sulphur Co. for the year ended December 31, 1929, shows net income of $16,247,478, after expenses, costs, federal taxes, etc.; equivalent to $6.39 a share on 2,540,000 no-par shares of stock. This compares with $14,517,619, or $5.71 a share in 1928.

Giant Portland Cement

Giant Portland Cement Co. reports, for the year ended December 31, 1929, net income of $84,261, after depreciation, interest, federal taxes, loss on dismantled machinery, equivalent to $2.26 a share on 37,233 shares of 7 per cent preferred stock (par $50). This compares with net income in previous year of $174,870, equal after preferred dividend requirements, to $1.98 a share on 22,085 shares of common stock (par $50).

Alpha Portland Cement

Alpha Portland Cement Co. reports, for the year ended December 31, 1929, consolidated net income of $1,815,018 after depreciation and federal taxes; equivalent, after dividends on the 7 per cent preferred stock, to $2.35 a share on 711,000 no-par common shares.

Consolidated income account for the year ended December 31, 1929, follows:

Net sales	$11,368,968
Expenses	8,336,699
Operating profit	$ 3,032,269
Other income	307,297
Total income	$ 3,339,566
Depreciation	1,299,548
Federal taxes	225,000
Net income	$ 1,815,018
Preferred dividends	140,000
Common dividends	2,133,000
Deficit	$ 457,982

Consolidated balance sheet of Alpha Portland Cement Co., as of December 31, 1929, follows:

Assets

Land, bldg., mach., equip., after depr. and depl	$21,932,994
Cash	2,914,835
Call loans	2,600,000
Gov't bonds, etc	1,357,075
Working fund and advances	217,987
Acct. and notes rec	399,150
Inventories	2,895,380
Misc. investments	273,039
Deferred charges	138,317
Total	$32,729,677

Liabilities

7% Preferred stock	$ 2,000,000
*Common stock	24,134,500
Acct. payable	328,951
Wages payable	35,460
Fed. and other taxes	268,061
Dividends payable	533,250
Reserves	713,969
Earned surplus	4,715,486
Total	$32,729,677

* Represented by 711,000 no-par shares.

Lawrence Portland Cement

Lawrence Portland Cement Co. reports, for the year ended December 31, 1929, net profit of $476,725 after charges, depreciation and taxes; equivalent to $6.35 a share (par $100) on 75,000 shares of stock. This compares with $721,720 or $9.62 a share earned in 1928.

LEGAL INFORMATION FOR OPERATORS

Mechanic's Lien Prior To Mortgage

In Lawrence v. Wright, 124 So. 697, a higher Court held that a mechanic's lien for materials furnished a contractor is prior to a mortgage on the real estate, although the building contract was not recorded.

In this case, a seller supplied some sand and rock material to be used in the construction of a building. Before the building was completed, but after the first load of material was delivered on the grounds, the owner of the property mortgaged it. Later the owner failed to pay for the material. The seller filed a mechanic's lien and duly recorded it, but failed to send the owner a sworn itemized statement of the materials furnished. The holder of the mortgage contended that for the reason that he received no statement and also that the building contract was not recorded his mortgage was prior to the lien. However, the Court held the lien prior to the mortgage, and said:

"The sole issue presented by this case is whether or not it is necessary for a materialman to serve a sworn itemized statement of his claim upon the owner, in addition to the recordation of his claim in the mortgage office, in order to have a valid lien upon the property of the owner. . . . We can see no good reason why the owner in the case where no contract is entered into or where a contract is entered into and not recorded should not receive notice of the lienor's claim because the theory of notice to the owner is to give him an opportunity to protect himself against a defaulting contractor. . . . But we are driven to the conclusion that the Legislature intended that, in cases where there were no contracts or where there were contracts and they were not recorded or where the owner or his authorized agent undertakes the work, that the owner is not entitled to receive such notice from the lienor."

Construction of Lease Contract Is Important

Several very important points of the law were decided by the Supreme Court of New York in the recent case of Bevin v. Henry Steers Sand & Gravel Co., 219 N. Y. S. 14. The facts of the case are that a sand company leased property for the purpose of digging therefrom sand and gravel. The term of the lease was for ten years at a *minimum rental* of six thousand dollars per year. The company agreed to pay ten cents per cubic yard for all gravel and sand removed.

The apparent intention of the contracting parties was that the sand company should pay at least a minimum rental of six thousand dollars during each year, and further, that the sand company could at any time cancel the lease by giving written notice to the owner of the property three months in advance *"in the event that extended bed or beds of clay be found* upon the leased property within fifty feet of the natural surface of the ground, with the result that a deposit of sand or gravel of at least twelve feet in thickness is not available."

The sand company did not commence excavating the sand and gravel for almost two years after the contract was signed but paid the agreed six thousand dollars minimum rental. Three years later the sand company wrote to the owner of the premises explaining that all of the sand and gravel was exhausted, and canceled the lease. The company refused to pay the minimum six thousand dollars yearly rental after it had removed its machinery from the property. The owner sued for six thousand dollars a year for the balance five year period of the lease.

It is interesting to note that the higher Court held the sand company liable since the lease contract did not specifically mention that no further rental was payable if the sand and gravel became exhausted before the expiration of the ten year period. This Court said:

"I do not agree that there is any doubt or uncertainty or ambiguity about the agreement in the case at bar. The intention of the parties gathered from the entire instrument is to govern. . . . When an instrument is clear and unambiguous, we are not obliged to refer to 'practical construction' by the parties, or the abstruse reasons of learned Courts concerning other leases and other agreements differing from that now before us. . . . The lease contains no provision for cancellation on the ground of exhaustion of sand and gravel. . . . The lease of the property was for ten years, with an absolute covenant to pay a minimum rental of six thousand dollars per year in each year of the term. . . . It was only in case extended beds of clay were discovered upon the leased property. . . . with a result that a deposit of sand or gravel of at least twelve feet in thickness was not available to the tenant, *in that case only was the tenant entitled to give three months notice of his intention to cancel the lease.*"

Payment Credited to Wrong Account

Generally speaking, where a purchaser has two or more accounts with a materialman and the former makes a payment, without specifying which account shall be credited, the materialman is privileged to credit the payment to any account he chooses.

For instance, in Radichel v. Federal Surety Co., 226 N. W. 473, it was disclosed that a contractor had several accounts with a materialman. He furnished a bond guaranteeing performance of a certain construction contract and payment for labor and material. He made a $5,000 payment on No. 78 account and the materialman, through error credited the contractor's bonded No. 1 account with this amount. Later the contractor abandoned the bonded job and the surety insisted that his liability should be reduced by the $5,000 payment which the materialman mistakenly credited to the contractor's bonded No. 1 account. However, the Court held the surety liable for this full amount, saying:

"The evidence warrants the finding that a $5,000 payment was made by the contractor under circumstances which gave the plaintiff (materialman) the right to apply the same as he chose, and that . . . it was at all times the intention of plaintiff to apply said payment upon No. 78 account and not on the one here involved; that a bookkeeper in plaintiff's office erroneously entered it as a credit on the No. 1 account; that about three months later this erroneous credit was noticed and corrected. . . . The credit was never intentionally or properly made on the No. 1 account. Defendant (surety) had no right to control the account upon which this payment should be credited. In the first instance, the contractor could designate the account upon which the credit should be made. In the absence of such designation, plaintiff could apply it as it desired. Here it eventually appeared upon plaintiff's books as was the intention of both debtor and creditor. Defendant (surety) had no right to direct how it should be applied or to whom it should be paid."

TRAFFIC NEWS AND COMMENT

Cement from Graystone, Ala.

Southern Freight Association Docket 48797 covers an application filed by shipping interests seeking a new line of rates on cement from Graystone, Ala., to destinations in Southwestern territory.

The shippers ask the carriers to publish to destinations in Arkansas, Louisiana (west of Mississippi river) and Missouri to which rates are published from Birmingham, Ala., in S. W. L. tariff 168, Agent Johanson's I. C. C. 2098 and to points in Oklahoma and Texas shown under Note A (below), on basis of the scale prescribed in I. C. C. Docket 16845, and to the territory described under Note B (below) rates to be made on basis of Western Cement Scale No. 4.

Note A—To apply to the following territory:

Oklahoma

On and east of the A. T. & S. F. Ry., extending from Anthony, Kansas across the Missouri-Oklahoma line to Medford, Okla., thence on and east of the C. R. I. & P. Ry. from Medford through Enid, El Reno, Chickasha and Waurika to the Texas border.

Texas

On and east of the line formed by the C. R. I. & P. Ry. from the Texas state line south of Terral, Okla., through Bowie to Ft. Worth, thence to G. C. & S. F. Ry. through Morgan to Temple, thence the M.K.-T. Ry. in connection with the I. G. N. Ry. through Georgetown, San Marcos and New Braunfels to San Antonio and thence the S. A. & A. P. Ry. through Gregory to Corpus Christi.

Note B—West of the above line, except points on the Southern Pacific Ry. west of Del Rio on the K. C. M. & O. Ry. west of San Angelo and on the T. & P. Ry. west of Big Spring.

Limestone

Southern Freight Association Docket 48747 relates to a petition filed by a shipper asking for revision of rates on limestone or whitestone from Whitestone, Ga., to destinations in the State of Alabama.

The shipper asks that the carriers establish rates on limestone or whitestone, ground, powdered or pulverized on basis of the Georgia-Alabama scale, less 10 per cent, subject to I. C. C. Docket 19943 scale as minimum.

Agricultural Limestone

Central Freight Association Docket 23748 covers an application filed by a shipper seeking reduction in rates applicable on agricultural limestone in box cars from Gibsonburg, and Woodville, O., to various destinations in Indiana.

The following are a few examples of the reduction sought:

TO	Rate in Cents per Ton Present	Proposed
Alida, Ind	250	230
Belfast, Ind	250	220
Columbia City, Ind	189	190
Ft. Wayne, Ind	189	190
Hartsdale, Ind	260	240
Howe, Ind	220	190
Kendallville, Ind	200	180
Knox, Ind	250	220
LaGrange, Ind	220	190
LaPaz Jct., Ind	220	200
Magee, Ind	250	220
Milford Jct., Ind	220	200
North Liberty, Ind	230	200
Plymouth, Ind	202	200
Rochester, Ind	230	220
Stroh, Ind	200	190
Valparaiso, Ind	250	230
Waterloo, Ind	190	160
Westville, Ind	250	230
Wilders, Ind	250	230
Uniondale, Ind	200	200

Coated Crushed Stone

A shipper of crushed stone and gravel, coated with oil, tar or asphaltum, shipped from South Lebanon, O., has asked the Central Freight Association in its Docket 23754 to establish new commodity rates to various destinations in Indiana, of which the following are representative:

TO	Proposed Rate
P. R. R.	
Richmond, Ind	$1.42
Bunker Hill	1.88
Muncie	1.88
Indianapolis	1.88
Jeffersonville	1.88
Switz City	2.11
Lawrenceburg	1.19
Cottage Grove	1.42
Hillsdale	2.11
Cent. Ind. R. R.	
Noblesville	1.88
Advance	1.99
C. I. & L. Ry.	
Delphi	2.11
Greencastle	1.99
Cass	2.22
C. & O. Ry.	
Cottage Grove	1.42
Muncie	1.88
Marion	1.88
C. M. St. P. & P. R. R.	
West Dana	2.11
Beehunter	2.11
Elizabethtown	1.76
C. & E. I. Ry.	
Cayuga	2.22
Hillsdale	2.11
Princeton	2.22
Poseyville	2.34
C. C. C. & St. L. Ry.	
Muncie	1.88
Losantville	1.53
Covington	2.11
Lebanon	1.99
Sheff	2.22
Fairmount	1.88
Jeffersonville	1.88
I. C. R. R.	
Clay City	2.11
Elnora	2.11
Evansville	2.34
E. I. & T. H. R. R.	
Clay City	2.11
Elnora	2.11
Evansville	2.34
N. Y. C. R. R.	
Handy	2.22
Sloan	2.22
N. Y. C. & St. L. R. R.	
Swayzee	1.88
Veedersburg	2.11
Alexandria	1.76
Oxford	2.22
Connersville	1.53
Sou. Ry.	
Corydon Jct	1.99
Oakland City	2.22
Lincoln City	2.22
Rockport	2.22
Wabash Ry.	
Delphi	2.11
Fayette	2.11
Attica	2.11
West Lebanon	2.11
Covington	2.11

Crushed Stone

The carriers have under consideration, in Trunk Line Association Docket 22648, request of a shipper for lower rates on Crushed Stone from Dalmatia, Penn.

The following are representative of the reductions sought:

TO	Proposed Rate	Present Rate
Centralia, Pa	$1.15	$1.50
Ashland, Pa	1.30	1.60
Bloomsburg, Pa	1.25	1.50
Rupert, Pa	1.15	1.40

It is claimed that the proposed rates are more comparable with other rates in the same territory.

Crushed Stone Screenings

Central Freight Association Docket 23781 relates to petition filed by a shipper seeking reduction in their present rates on crushed stone and crushed stone screenings from Apex, Ohio, to various destinations in the State of Ohio and West Virginia as shown below; which is a partial list of the changes sought:

TO	Proposed Rate
Penn. R. R.	
Highland Springs Ohio	$1.00
Salineville, Ohio	.95
E. Liverpool, Ohio	1.05
Empire, Ohio	1.05
Brilliant, Ohio	1.15
Waynesburg, Ohio	.90
Dover, Ohio	1.00
Newcomerstown, Ohio	1.15
Crystal Springs, Ohio	1.00
Vanport, Pa	1.30
Chester, W. Va	1.40
Brownsdale, W. Va	1.30
Weirton, W. Va	1.30
N. Y. C. R. R.	
Palmyra, Ohio	.90
Mt. Union, Ohio	.80
Minerva, Ohio	.70
Bergholz, Ohio	.70
Piney Fork, Ohio	.70
W. & L. E. R. R.	
Chagrin Falls, Ohio	1.05
Unionvale, Ohio	.70
St. Clairsville, Ohio	.80
P. & W. Va. R. R.	
Virginia, Pa	1.00
Woodrow, Pa	1.10
Bower Hill, Pa	1.20
B. & O. R. R.	
Burton, Ohio	1.05
Ravenna, Ohio	1.25
So. Akron, Ohio	1.35
Erie R. R.	
Summit, Ohio	1.35
West Salem, Ohio	1.25
Barberton, Ohio	1.15
Kent, Ohio	1.05
Pavonia, Ohio	1.35

INSURANCE PROBLEMS DISCUSSED

Forgery Bonds

"Making big ones out of little ones" is among the leading rackets of the United States. Forgery and check alteration cost the country more than any other insurable risk except fire. Careful estimates of banking and credit authorities place the annual loss from forgery at upwards of $250,000,000. Compared to the annual cost of tornadoes, earthquakes and all other risks, except fire, this is a tremendous bill. Worse than the mere size of the loss, however, is the fact that forgery strikes all lines of business, all parts of the country, and is found in small communities as well as in large cities.

The converse of our first sentence—that is, "making little ones out of big ones"—unfortunately is not so certain to follow. Forgers usually know the ropes pretty well, and they get such a head start on detection that they may get away to "healthier" climates and escape punishment.

Just as the methods of Jesse James have been modified by the more scientific modern racketeers, so the work of forgers has become more skillful to meet present-day conditions. Of course, there are still a few striking cases every year of a forger negotiating a single check for a very large amount. But the recent development of the forger's art has been the series of forged checks, no one of which is big enough to attract notice until the end of the month.

Payroll Checks

Suppose, for example, that a corporation pays its workers by check, and for extra protection prints across the face of the checks something like "Payroll check—not over $100." Suppose, too, that several checks for amounts from $85 to $100 are presented for payment immediately after the first pay day of the month. The corporation's regular bank will honor these checks as a routine transaction and the checks will not be noticed until the monthly statement is made up. By that time the forger will have been well on his way to other fields and the corporation will pocket the loss.

Some of these series of checks are for larger amounts. I have seen photostatic copies of eight checks for $7,000 each, with the corporation's signature forged, all presented for payment the same day at different banks. The single amounts of $7,000 were small enough not to arouse suspicion of the bank employees; yet the total loss ran more than $50,000. There are also, of course, constant losses of a few hundred or a few thousand dollars on single checks which are not in series, but the series is becoming a popular idea not only because it yields a large total but also because once a crook has the model it is about as easy to make up eight checks as to make one.

Liability of Banks

It should also be noted that depositors have very little redress against the banks when checks are forged. The law requires banks to use ordinary care in identifying signatures, but imposes no other liability on them. It is very hard to prove that a bank has been grossly negligent in passing a forged check, because the forged signature is usually a very good match to the original one, and where that is the case the bank has no responsibility for the loss.

You may wonder, at this point, how such great losses can occur in a day when check-writing machines and safety paper are in common use. These safety devices are undoubtedly valuable. They certainly cut down losses and should be used by everybody, for they well repay their small cost. Of present day losses, however, fifty per cent are for forged signatures, forty-five are forged endorsements and only five per cent are alterations in the name of payee, amount or date. Safety devices can practically eliminate the risk of check alteration, but they do not reduce the risk of forgery materially, because most forgeries are committed on genuine checks obtained dishonestly or on copies of genuine checks.

Who are the present-day forgers? There are, as might be expected, some professional forgers. These people flit about the country, staying only two or three months in each town—just long enough to establish a bank account and obtain their materials. These professionals can work only with inside help. They may get an employee to let them take a genuine firm check as a sample, or they may get hold of a genuine check through some legitimate business transaction and hold it just long enough to make a copy, later releasing it in a normal way.

The problem of forgery is more perplexing, however, because more and more we find it is the old and trusted employees who are guilty. Without implying any suspicion of any of your senior workers, it should be pointed out that even steady workers face ever-changing personal problems in their private lives; their characters are constantly being changed, whether for good or bad. The very confidence which you place in them creates an unreasonable temptation, and if they ever do lose their sense of balance they know all the inside tricks of your office and can capitalize on it easily. The downfall of faithful employees comes most often from gambling (either the stock market or horse races), though there are plenty of sad cases where the motive was simply new dresses or a fine radio. It is not fair to your workers to put them in the way of temptation, and not only should you keep a check on giving unlimited responsibility to any one worker, but you should have personal knowledge of the private life and ambitions of your force.

How much can a forger get away with? Roughly speaking, a forger can get away with your maximum bank balance. Through the invention of the series plan he can pass through a large total amount in a single day, and he will make it his business to do this at a time when your bank account is the largest, in order not to attract notice.

The risks of forgery and check alteration can be insured under a policy called the "forgery bond," with a standard form which is issued by many of the large casualty insurance companies. The premium is small by comparison with rates for fire and other insurance, and special credits are also allowed for check-writing machines and safety paper. It is possible to insure forgery of checks which you take in as well as those you pay out. But in producing or manufacturing industries, there is little risk connected with incoming checks; they pass through very few hands and can usually be traced readily or even duplicated. But, on outgoing checks, once a check has left your hands you have no control over it. You are at the mercy of the payee's employees and countless others who may be able to get their hands on it, and forgery insurance is therefore now regarded as one of the major forms of protection.

REVIEW OF FOREIGN PRACTICE

Gypsum as Source of Lime, Cement and Other Products

The problem of the production of hydraulic mortars from gypsum with simultaneous production of sulphur in a useful form is not new, but has recently come into prominence because of a great amount of work being done upon it. A really good quality cement or lime, together with sulphur dioxide gas in sufficiently great concentration to be commercially useful, may be obtained from the calcium sulphate. Some of the practical methods developed are as follows:

(1) The gypsum is reduced to calcium sulphide by means of powdered coal, the sulphide treated with steam, to generate hydrogen sulphide, leaving a residue of lime, and the sulphide gas burned with just sufficient air to form sulphur.

(2) Another process involves the heating together of gypsum and calcium sulphide, a procedure which results in the formation of sulphur dioxide and lime. $3CaSO_4 + CaS = 4CaO + 4SO_2$. The quicklime formed is very pure.

(3) The last procedure has been modified by the use of an aqueous solution of a sulphide or sulphydrate which forms a more intimate mixture and secures an easier reaction.

(4) Lime and sulphur dioxide can be obtained from gypsum by the simple, carefully regulated heating in the presence first of reducing and later of oxidizing gases. Calcium sulphide is first formed and this is later oxidized to lime and sulphur dioxide. $CaSO_4 + 4CO = CaS + 4CO_2$ and $CaS + 30 = CaO + SO_2$.

(5) The electrolysis of anhydrite ($CaSO_4$) in the molten form in the presence of an excess of air produces sulphur trioxide and lime.

(6) As an example of the many methods of preparing portland cement from gypsum, finely powdered burned gypsum and clay are mixed, pressed into bricks with the aid of a little water and burned. Sulphur dioxide and a true portland cement are formed.

By variations involving the use of bauxite in the heating processes, aluminous cements can be produced closely approaching the composition of standard products and with by-products of value. Lime, hydraulic lime, cement, fused cement and aluminous cement may all be produced in this way. The economy of the mortar industry can be favorably influenced by the production of sulphurous by-products. Fr. Honus (*Zement*, Sept. 12, 1929).

Diatomaceous Earth as a Concrete Ingredient

Addition of diatomaceous to concrete causes the mix to be more pliable and easier to work. What is more important, it improves the quality of the concrete. Researches over a number of years show that diatomaceous is more efficacious as a concrete ingredient than either kaolin or lime. For example, in a standard mix of 1 : 2 : 4, 4 per cent of the weight of the cement in the form of this finely divided silicate, 8 per cent of kaolin and 12 per cent of lime all have about the same effect, which is equivalent to the addition of 25 per cent more cement. The diatomaceous earth (Kieselguhr, Celite, Silocel, etc.) is nearly pure silica, and it increases the strength of the concrete by rapidly combining with the free lime to form calcium silicate, while its fine state of division and light weight increases the pliability of the concrete so that it remains plastic until setting occurs, decreasing the danger of fissure formation. The impermeability to water is increased by this substance, first because of a more uniform mixture, and second, the voids are partially filled by this material. This addition also has the effect of producing a closer bond between the concrete and steel, a matter of considerable importance. As no deleterious actions occur by reason of its presence, the use of diatomaceous earth is strongly recommended. Geh. Regierungsrat Wernekke. (*Tonindustrie Zeitung*, Nov. 4, 1929.)

Calcium Sulpho-Aluminate Cement

A hydraulic binding material consists of an intimate mixture of aluminous cement, prepared by melting, clinkerizing or fritting, and calcium sulphate in dry form, such as gypsum, anhydrite or more or less burned plaster. The proportions are preferably such that all the alumina is converted into calcium sulpho-aluminate and the mixture usually contains from 20 to 50 per cent of calcium sulphate. Other proportions of from 5 to 95 per cent of either ingredient may also be used. The calcium sulphate is added to the raw material of the aluminous cement, the mixture being then heated without melting. Soc. Anon. des Chaux et Ciments de Lafarge et du Teil (British Patent 317,783).

Steam-Curing of Portland Cement Mortars

An attempt has been made to elucidate the increased tensile strength and resistance to disintegration by sulphates of portland cement mortars, which results from steam-curing. Resistance to sulphate action was studied on a 1 : 10 mix, by measuring the expansion produced by immersion in 2.1 per cent and 6.7 per cent solutions of sodium sulphate. Variations in the tensile strength and changes of crystalline forms were studied in 2-day and 28-day briquettes (1 : 5 mix) after curing in steam for 6 hours at temperatures ranging from 100 deg. to 200 deg. and also at 150 deg. for periods up to 48 hours. No relationship between sulphate-resistance and tensile strength was established. Hydration increased with time of steaming and with temperature of the autoclave. Crystals of hydrated lime were formed at once and increased to a maximum of 175 deg., and thereafter decreased, but at the same time a new crystalline form appeared to which the increased resistance to sulphate attack is thought to be due, since the crystals are very stable to heat, being unchanged after 24 hours at 400 deg., but darkening after prolonged heating at 650 deg. They are readily decomposed by very dilute acids, hydrochloric acid giving a skeleton of insoluble matter, and sulphuric acid producing a large amount of gypsum. T. Thorvaldson and G. R. Shelton (Canad. J. Res. 1929, 1, 148-154). B. C. A.

Mixed Portland Cements

"Neo Soliditite" cement is formed from 70-75 per cent portland cement clinker, 10-20 per cent calcined granite and 10-20 per cent natural or artificial material containing soluble silicic acid. After 28 days combined curing, this product shows a compressive strength of 12,283 lb. per sq. in. and 838 lb. per sq. in. tensile strength. The three ingredients were mixed 3-5 per cent gypsum added, and ground extremely finely.—S. Nagai (*J. Soc. Chem. Ind.*, Japan, Vol. 32, No. 7, 1929, and *Zement*).

LATEST NEWS FLASHES

MacNeal Moves Offices

Donald B. MacNeal announces the removal of his office to Loomis and 121st streets, Chicago, where he maintains a yard with a full equipment of cranes, draglines and shovels, and continuous day-and-night service in sales and rentals of such equipment.

Heltzel Appoints Representatives

The Heltzel Steel Form & Iron Company announces the appointment of the following new representatives: Stuart M. Christhilf & Co., Inc., 205 Snow Building, Baltimore, Maryland; J. B. Harbison Equipment Co., 209 Spring Street, Little Rock, Arkansas; Hudson Supply & Equipment Co., Seventh & T Streets, N. E., Washington, D. C.; Kratz & McClelland, Inc., 522 Bryant Street, San Francisco, Calif.; Banks-Miller Supply Co., Huntington, West Virginia; Crook Company, 1220 So. Grand Ave., Los Angeles, Calif.; The C. H. Jones Co., 134-140 Pierpont Ave., Salt Lake City, Utah, and Waterhouse Equipment Co., Inc., Jackson, Mississippi.

Cutler-Hammer Appoints Burd District Manager

Effective February 1, Frank J. Burd becomes manager of the Philadelphia office for Cutler-Hammer, Inc., with main office at Milwaukee, Wis. He replaces T. E. Beddoe, who has resigned. An electrical engineer of some note, a specialist in motor control engineering, Mr. Burd is well qualified for his new position. He has been with the company continuously for the past thirty years, with the exception of two years during the war period, when he was electrical engineer for the Midvale Steel and Ordnance Co. at Johnstown, Pa.

Mr. Burd's knowledge and electrical experience on the application of motors and their control is spread over practically every industry. He is a member of the American Institute of Electrical Engineers, of the Association of Iron & Steel Electrical Engineers, Chicago Engineering Club and the Electrical Maintenance Engineers of Chicago. He has been much in demand as a speaker for engineering societies and has contributed numerous articles on the subjects of motor and control to the various publications.

Cutler-Hammer Moves Detroit Office

Effective February 10, the Detroit District Sales Office of Cutler-Hammer, Inc., is located at 2755 East Grand Boulevard, Detroit, Mich. The new location includes warehouse facilities where stocks will be carried for immediate delivery.

Bacon Resumes Connection With Byers Lines

The Byers Machine Company, Ravenna, Ohio, announces the appointment, effective immediately, of Edward R. Bacon as its sales representative in San Francisco and Northern California. The Bacon Company will handle the entire Byers line, including ¾-cu. yd., 1-cu. yd., 1¼-c. yd. shovels, cranes, draglines, trenchers and skimmers. Unusual interest attaches to this announcement, as the Bacon organization was previously the distributor in Northern California for the Byers line, comprising a continuous connection broken only during the past two or three years. Replacement parts will also be carried in San Francisco.

Delaware Has New Shipping Point

Hercules, Delaware, is the name of the latest shipping point to be added to the roster of freight forwarding and receiving stations in northern Delaware. The new station is on the Landenburg branch of the B. & O. Railroad and is marked by a special side track to the new Experiment Station being constructed by the Hercules Powder Company of Wilmington. Hercules, Delaware, is about five miles from Wilmington and is a freight station only.

Roadwork on the spacious grounds of the new experiment station site is practically completed and excavation is starting for the foundation work of the main laboratory building. A number of other buildings, including several semi-plant units, will be erected prior to the removal here of most of the company's research facilities from Kenvil, N. J.

McGann Manufacturing Appoints Consulting Engineer

The McGann Manufacturing Company, Inc., of York, Penna., designers and builders of lime plants and equipment, and which has the sole rights on this continent for the patented McGann-Sobek high efficiency lime kiln, announces that Oscar Sobek of Vienna, Austria, has arrived in the United States, and is now associated with this company in the capacity of consulting engineer to assist in the erection and operation of Sobek kilns.

Mr. Sobek is an European trained mechanical and combustion engineer, and has been associated with his father in all stages of the design and development of this modern kiln.

Great Lakes Expanding

Great Lakes Portland Cement Corp., 2500 Elm St., Cleveland, O., is enlarging its packing plant to include grinding mill with capacity of 1000 bbl. daily. Concrete clinker will be sent to Cleveland from company's Buffalo cement plant for grinding, and burned in kilns at other mills. Cleveland plant, which has heretofore been used only for handling and packing, will be in operation by April.

Alpha Builds Plant

Alpha Portland Cement Co., Easton, Pa., will design and build new mill near Jamesville, N. Y., to cost over $500,000 with machinery.

Inland Lime Completes Initial Unit

Construction of the first unit of the Inland Lime and Stone Company plant was completed this week, when Merritt, Chapman, Scott corporation put the finishing touches on the huge breakwater and levee at the harbor site at Seul Choix.

The breakwater extends three-quarters of a mile into Lake Michigan and six feet above the normal lake level. Approximately 250,000 tons of stone was used in the construction, the stone being taken from the new quarry opened up on the Dolomite section of the Inland holdings.

Considering the handicaps faced building, that of moving equipment over poor roads and also rebuilding a portion of the breakwater torn away during a severe storm last September, the construction was completed in record time. Work on the unit was started last May. With the completion of this job, the New York contractors will stop work until March 15, when they will begin construction on the docks.

Yale and Towne Opens Offices

The Yale & Towne Manufacturing Co. announces the opening of its Syracuse, N. Y., sales office, Room 534 Gurney Building, for the sales and service of Yale electric industrial trucks, tractors, trailers, Stuebing hand lift trucks and skid platforms in the New York State area. H. R. Bungay, Jr., who has had many years' experience as a materials handling engineer, will be in charge of this office and will be assisted by George Sherrill.

Engineers' Reference Book

The third edition of a "Handbook of Formulas and Tables for Engineers" is presented by McGraw-Hill Book Company, Inc., 370 Seventh Ave., New York, N. Y. This pocket-size, flexible volume is what its title indicates. In condensed form it contains the processes that are useful to engineers in algebra, geometry, trigonometry, analytic geometry, and calculus. Sections, also, are devoted to all sorts of measurements; physical and chemical properties of substances; mechanics; columns, beams and jointed frames; structural data; reinforced concrete; strength of materials; standard gauges, fastenings, flanges; steam tables, charts; and mathematical tables. The authors are Professors Peirce, Carver, and O'Rourke, all of Cornell University. The price is $2.50 postpaid.

Canada Gypsum and Alabastine

Canada Gypsum and Alabastine, Ltd., has increased its capital stock from 500,000 to 2,000,000 no par shares.

Sales of Slate in 1929

The value of the slate sold at the quarries of the United States in 1929 was $10,868,000, according to estimates furnished by producers to the United States Bureau of Mines, Department of Commerce. This was 5 per cent less than the value reported for 1928.

The roofing slate sold in 1929, estimated at 441,000 squares, valued at $4,630,000, decreased 9 per cent in quantity and 14 per cent in value over 1928. This represents a decrease of 70 cents in the average value per square. This decrease was largely in the New York-Vermont district where the estimated sales amounted to 148,500 squares, valued at $2,044,000, a decrease of 19 per cent in quantity. The sales of roofing slate in Pennsylvania was estimated at 243,000 squares, valued at $1,950,000, a decrease of 5 per cent in quantity. There was an increase in sales of Virginia and Maine roofing slates.

The total sales of mill stock in 1929, estimated at 9,200,000 square feet, valued at $3,521,000, a slight decrease in quantity and an increase of 3 per cent in value. Mill stock for structural slate—2,768,000 square feet, valued at $1,110,000—increased 9 per cent in quantity and 7 per cent in value. Electrical slate — 1,424,000 square feet, valued at $1,140,000—increased 10 per cent in quantity and 11 per cent in value. Slate for school slates — 1,620,000 pieces (865,000 square feet), valued at $20,000—increased 2 per cent in quantity but decreased 11 per cent in value. Mill stock for blackboards and bulletin boards—3,415,000 square feet, valued at $1,041,000—decreased 8 per cent in quantity and 3.5 per cent in value in 1929. Slate for billiard-table tops—248,000 square feet, valued at $89,000—decreased 15 per cent in quantity and 19 per cent in value. Slate for vaults and covers—480,000 square feet, valued at $121,000—decreased 10 per cent in quantity and 12 per cent in value.

There was apparently a considerable increase in the quantity of slate sold for flagging, cross-walks, stepping-stones, etc. This was estimated at 1,317,000 square feet, valued at $187,000 in 1929, compared with 932,110 square feet, valued at $184,184 in 1928.

The sales of crushed slate for roofing granules and flour in 1929 was estimated at 430,000 short tons, valued at $2,530,000. This represents an increase of 4 per cent in quantity and 2 per cent in value.

The accompanying table compares the estimated sales of slate by quarrymen in 1929, by uses, with the sales in 1928.

Roofing Slate, Mill Stock[a], and Slate Granules Sold in United States in 1928 and 1929, by Uses

	1928		1929 (estimated)	
	Quantity	Value[b]	Quantity	Value[b]
Roofing.....squares	483,280	$5,411,332	441,000	$4,630,000
Approximate equivalent in short tons.....	177,310	.....	159,500	.....
Electrical.....square feet	1,289,060	1,025,386	1,424,000	1,140,000
Approximate equivalent in short tons.....	10,990	.....	12,300	.....
Structural and sanitary.....square feet	2,543,470	1,034,818	2,768,000	1,110,000
Approximate equivalent in short tons.....	19,900	.....	22,000	.....
Grave vaults and covers.....square feet	532,570	136,836	480,000	121,000
Approximate equivalent in short tons.....	5,060	.....	4,940	.....
Blackboards and bulletin boards....square feet	3,713,840	1,079,452	3,415,000	1,041,000
Approximate equivalent in short tons.....	9,450	.....	8,700	.....
Billiard-table tops.....square feet	293,360	109,221	248,000	89,000
Approximate equivalent in short tons.....	2,550	.....	2,200	.....
School slates.....pieces	1,584,820	22,591	1,620,000	20,000
Approximate equivalent in square feet.....	847,870	.....	865,000	.....
Approximate equivalent in short tons.....	740	.....	760	.....
Flagstones, walkways, etc.....square feet	932,110	184,184	1,317,000	187,000
Approximate equivalent in short tons.....	6,290	.....	9,400	.....
Granules.....short tons	413,980	2,468,471	430,000	2,530,000
Total (quantities approximate, in short tons)..	646,360	11,472,291	649,800	10,868,000

a In 1928 the mill stock sold, including school slates, was 9,220, 170 square feet, valued at $3,408,304; in 1929, 9,200,000 square feet, valued at $3,521,000.
b F. o. b. at point of shipment.

Signal Mountain Re-elects Officers and Directors

At the annual meeting of the Signal Mountain Portland Cement Co., held January 23, 1930, in Chattanooga, Tenn., all of the officers and directors were re-elected, as follows: President, John L. Senior; vice-presidents, Hardwick Caldwell and S. W. Storey; treasurer, J. P. Hoskins; secretary, R. L. Caskey. These and the following compose the board of directors: F. P. Butler, D. F. McPherson, C. L. Hardwick, Fred Carter, L. L. Fischer, U. T. Trimby, and R. G. Wright.

Canada Gypsum Changes Name

Due to the increased importance of Canada Gypsum and Alabastine, Ltd., as an exporter this company has changed its name to Gypsum Lime and Alabastine, Canada, Ltd. Export sales during 1929 are stated to have been 30 per cent higher than in 1928. The company will start construction on a new western plant immediately.

Sales of the company during December showed an increase of about 35 per cent over the same period a year ago and for the full twelve months were about 36 per cent ahead of the year 1928.

Repeat Orders for Norblo Equipment

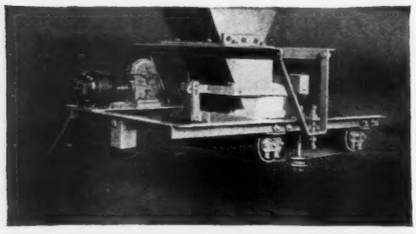
Orders recently received by Northern Blower Company for Norblo cement mill dust collecting equipment include dust collecting system for drag-chains, elevators and bins in raw grinding mill of Marquette Portland Cement Company; a complete system for raw grinding department of Alpha Portland Cement Company, Ironton, O., also one for the sacking department of the San Antonio Portland Cement Co., San Antonio, Texas.

NEW MACHINERY AND SUPPLIES

A New Type Feeder

A regulating feeder which eliminates variations in feed due to changes in size of material, moisture content and specific gravity has been developed by the Hardinge Company.

The Hardinge Constant Weight Feeder regulates by weight rather than volume. It automatically maintains the weight constant, no matter how conditions change. A travelling belt, attached to a frame, on which



The new feeder

the driving mechanism is also located, is suspended so that any variation in the weight on the belt moves the frame, which in turn moves the feed gate. When the weight increases, the belt frame lowers and the gate shuts tightly, thus reducing the quantity of feed. If the weight decreases, the belt and frame rises, opening the gate and increasing the quantity of feed. A balancing weight controls the quantity desired and a revolution indicator makes it possible to record the weight for any given period.

The feeder is a self contained unit and no auxiliary driving mechanism is required. By means of a control device, the feed can be varied at will any desired distance from the feeder itself. With this feeder, the average mill capacity can be increased at least 5 per cent over the volume method of feeding. Capacities range from 100 pounds an hour to over 100 tons an hour per unit.

Its application is manifold. As a pulverizer feeder it eliminates irregularities due to bin segregation and moisture. It can be used in inaccessible places where ordinary electric light current is available as it carried its own motive power. For proportioning raw mix, the proper percentages of limestone, slag and other materials can be fed to a common conveyor continuously and accurately by weight.

New Type Manometer Is Easy to Fill

With a view to overcoming the difficulty so often met with in filling the tubes of manometers of the usual type, The Meriam Co. has recently placed on the market a specially designed manometer with a larger bore of tube than that generally employed.

This not only makes it easy to introduce the measuring liquid but also facilitates the disengagement of air-bubbles which would affect the accuracy of the readings—an especially important matter when measuring the flow of large volumes of liquids or gases at low pressures; for such cases, of course, a slight error in the difference between the levels in the two legs of the U-tube might result in a decided error in the rate of flow.

A still further advantage of the larger bore is that the greatest area largely neutralizes the capillary action of the sides of the tube, thus making the tops of the liquid columns less convex or concave, and therefore easier to read correctly. The makers state that the new type is finding favor among engineers, particularly in cases where the manometer must be refilled frequently, as in portable instruments.

The increased size of bore does not in any way affect the actual differential level between the two legs of the tube, because this depends only upon the difference in pressure between the two points to which the instrument is connected.

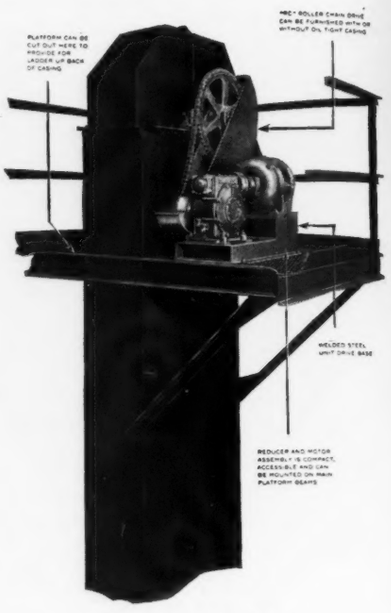
Moeller Company Changes Corporate Name

As of February 12, 1930 A. E. Moeller Co. of 261-265 Sumpter St., Brooklyn, N. Y., has been succeeded by the Moeller Instrument Company, Inc. The active ownership and management will remain the same as for many years past under the following personnel:

Charles E. Moeller, President and General Manager; Max E. Moeller, Vice-President and Head of Research Department; Curt F. Moeller, Treasurer and Factory Manager; Paul G. Moeller, Secretary and Charge of Sales Department; Otto J. Moeller, Asst. Treasurer and Glass Production Department, and Walter G. Moeller, Production Department.

Standardized Elevator Drive Announced

A new standardized drive for elevators has just been announced by H. W. Caldwell & Son Company of Chicago. This drive is compact, efficient and positively quiet at all speeds. It is built to operate centrifugal dis-



The elevator drive

charge, perfect discharge or continuous bucket elevators requiring 3 to 15 horsepower. The entire line is standardized and carried in stock.

The first reduction of the drive is made up of a ruggedly built fully enclosed worm gear speed reducer to which a motor is coupled. The motor and the worm reducer are acurately aligned on a welded steel base, making a compact assembly easily supported on the elevator casing or platform.

The second reduction in speed is made by a Link-Belt Roller Chain Drive, which was selected because it furnishes a maximum of strength, durability, efficiency and quietness of operation, combined with a minimum of weight and of space required. It also acts as a flexible connection between the reducer shaft and head shaft.

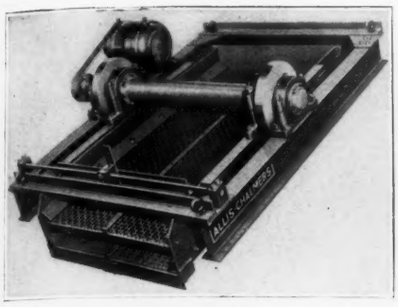
Centrifugal Vibrating Screens

The Allis-Chalmers Mfg. Co., appreciating the importance of vibrating screens in sizing various materials, has designed and introduced the centrifugal vibrating screen.

This screen is made in various sizes and with single or multiple decks.

The vibrating motion is mechanically produced and transmitted to the screen body, so that it is equal over the entire screen surface; this results in maximum capacity under all conditions.

The screen is of very rugged construction, and has self-aligning antifriction roller type bearings. Screen



Centrifugal vibrating screen

surfaces are easily removed and replaced. The angle of the screening surfaces can be easily adjusted to suit operating conditions. Allis-Chalmers enclosed fan cooled squirrel cage motors with anti-friction bearings are used for driving these screens through Texrope drives.

New Mixer Announced

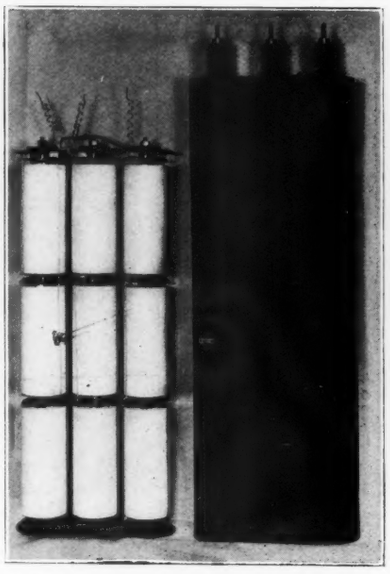
The Chain Belt Company has announced the Rex Mix Haul, a new development in truck-mounted mixers. After two years of experimenting in the field with various types of agitating and mixing bodies, Rex designed the Mix Haul, extremely portable, light in weight, and built to fit any make of truck. Mounted low on the supporting frame, with large charging opening, variable flow discharge chute, independent, easy turning drum with three-point anti-friction suspension, the Rex Mix Haul is an entirely self-contained unit, with its own power plant and own power take-off. The drum is driven by genuine Chabelco Chain, the transmission is fully enclosed and operates in a bath of oil, and the water is the same accurate system that is supplied on all Rex Mixers.

The Chain Belt Company has issued a pamphlet, "Mix Haul mixes while hauling," which is available to anyone requesting a copy.

Improved Cell Type Capacitors

The Electric Machinery Manufacturing Company of Minneapolis, Minn., has recently announced a new improved line of cell type capacitors for use in power factory improvement. These capacitors are built for either indoor or outdoor use, the outdoor type capacitor being completely enclosed in a sheet steel housing.

The E-M capacitor consists of an assembly of capacitor cells securely mounted on a rugged steel stand. Each cell is a complete capacitor unit, and by connecting two or more cells



Standard cell using nine capacitor rolls

in parallel, any desired kv-a. may be obtained.

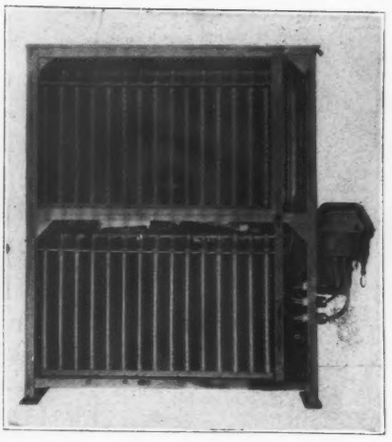
A feature of the E-M cell type capacitor is the cylindrical roll, which is the "working element" in the capacitor cell. The cylindrical form of construction prevents undue mechanical stress on the tissue, thus insuring long life.

The individual capacitor rolls are mounted on a supporting rack and sealed under oil in the cell. The cell containers are substantially built from 18 gauge sheet steel and have welded oil-tight joints. Stands for holding the cells are of welded sheet steel construction.

Quality Diesel Engines For Auxiliary Machines

The Cummins Engine Company of Columbus, Ind., manufactures a line of Diesel engines which is admirably adapted to furnishing auxiliary power to plants in the pit and quarry industries. The sizes of the Model U range from 8 hp. to 48-hp., and in this range are engines that may be applied to well drills, conveyors, elevators, crushers, clamshells, shovels, draglines and many different types of machines. They are especially useful on machines that must operate when the main plant is not in operation. For instance, a stripping machine or a drill may be operated without the necessity of powering the entire plant.

These engines are built in 1, 2, 3, 4, and 6 cylinder sizes, having a bore and stroke of 4½ in. by 6 in. and operating normally at 800 r.p.m. They are enbloc type with separate



Cell-type capacitor, with one screen removed

detachable heads and are equipped with one-piece air intake and exhaust manifold.

The engine is completely and fully enclosed, full pressure lubricated and self-contained in every way. All castings are properly ribbed and there are no loose water pipes, as the water goes directly from the pump into the end of the cylinder tank and through individual connections up into the cylinder heads, then out through cylinder heads down into water-cooled manifold and overboard.

Incidentally, one of these Model U Diesel engines was used as the prime mover in a 7-passenger Packard sedan which made a trip from Indianapolis, Ind., to New York, N. Y. The distance of 792 miles was covered at an average of 31.7 miles per hour and with a total cost of $1.38 for the 30 gal. of fuel oil consumed on the trip. This indicates that Diesel-driven trucks and automobiles will soon become more popular in the United States than in Europe, because of a better grade of Diesel engines available in this country.

Du Pont Develops New Explosives

E. I. du Pont de Nemours & Company, Wilmington, Del., announces that the Eastern Laboratory has recently developed two new low density gelatin explosives which will be marketed under the names of Gelex No. 1 and Gelex No. 2.

These new products are intended for use in ore mines and for the underground mining of limestone and other non-metallic minerals. Both Gelex No. 1 and Gelex No. 2 are extremely cohesive and plastic so that they will load well in upward pointing holes.

RESULTS THAT SPEAK FOR THEMSELVES

With the practical elimination of friction and vibration, and a tremendous power savings, the Wheeling Roller Bearing Crusher has firmly established itself as a leader to greater tonnage at a better profit.

Some of the Many Advantages are:

20% to 30% increased production due to high speed permissible with roller bearings.

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Elimination of starting troubles.

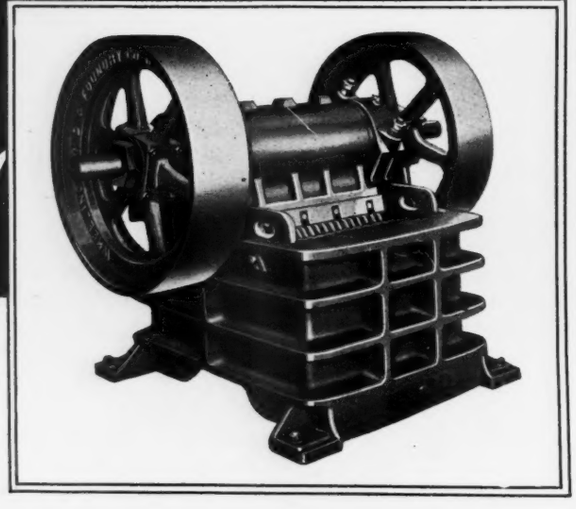
Crushers can be started fully loaded.

Elimination of vibration increases life of crusher and cuts down maintenance costs.

Crusher can be adjusted while in operation to produce any size finished product.

Due to special toggle design crusher will produce better sized material with minimum percentage of returns from screen.

"Your Next Crusher Should Be A Wheeling."



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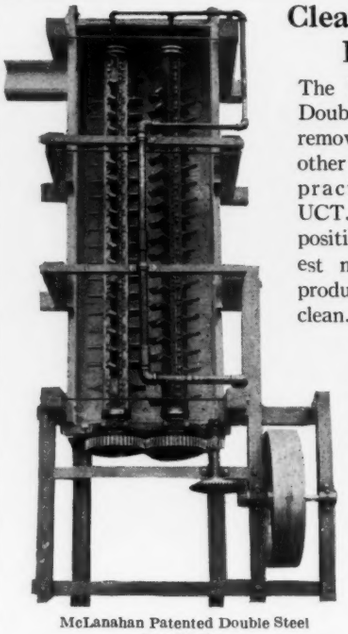

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The McLanahan Washer has simplicity combined with strength, and is easily accessible for the very few repairs needed from time to time. It will produce large tonnages of a uniformly clean product at an extremely low cost.

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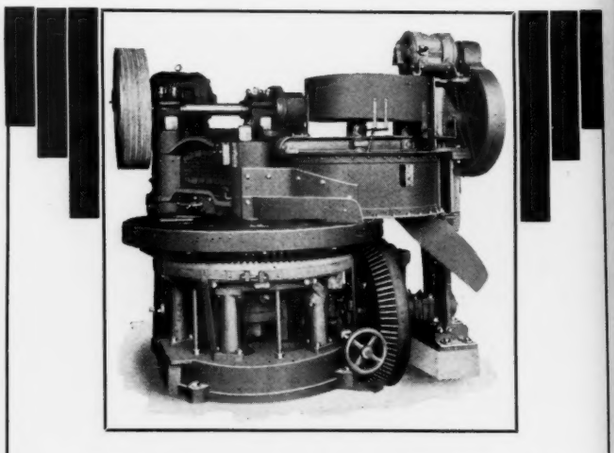

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